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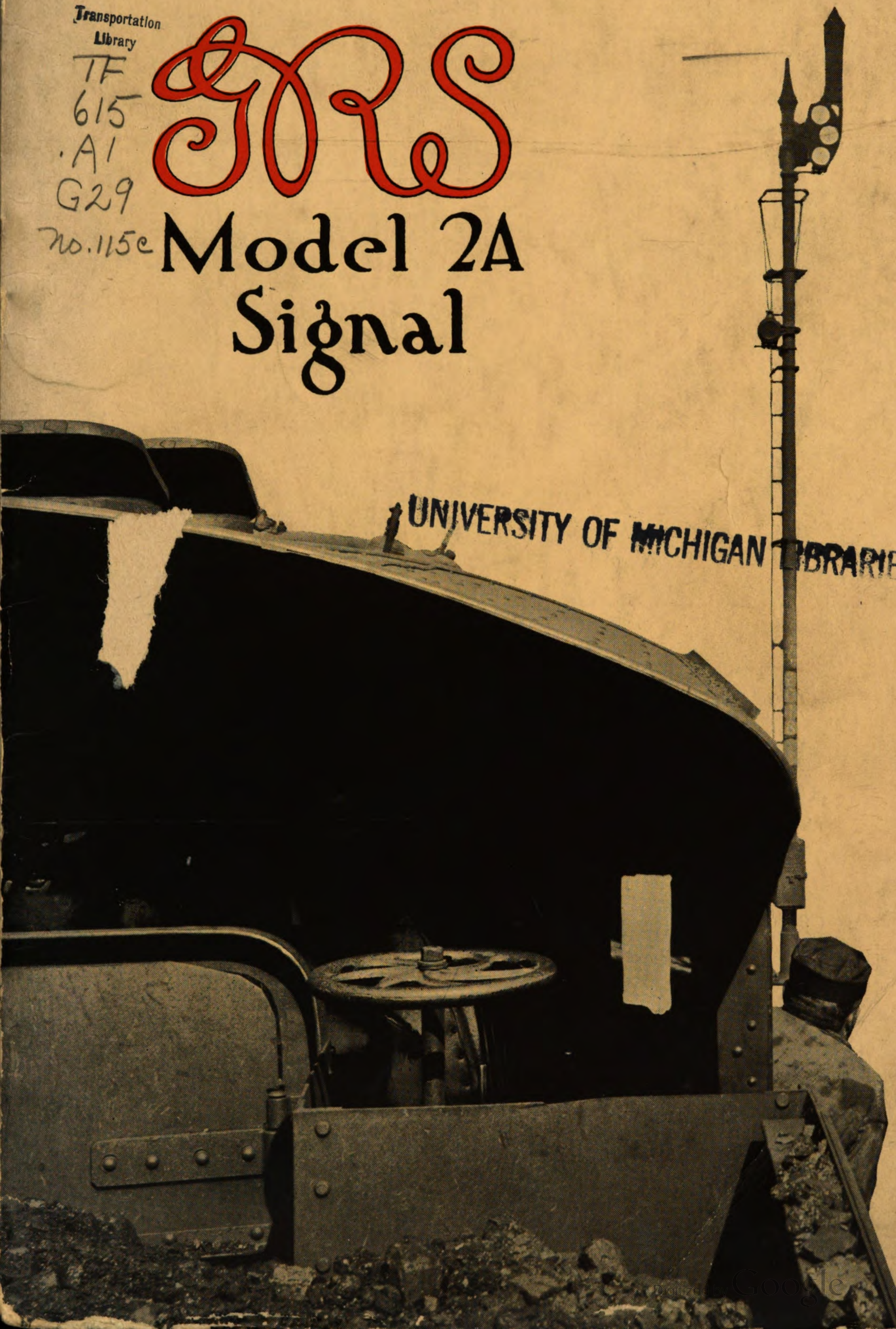
GRS

Model 2A Signal



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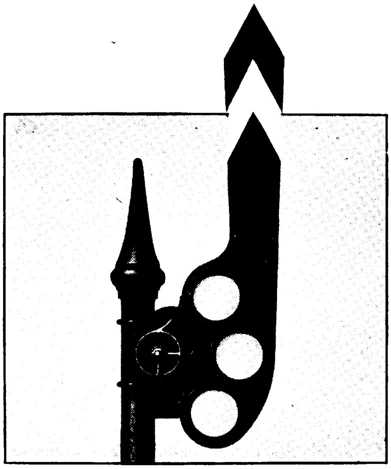

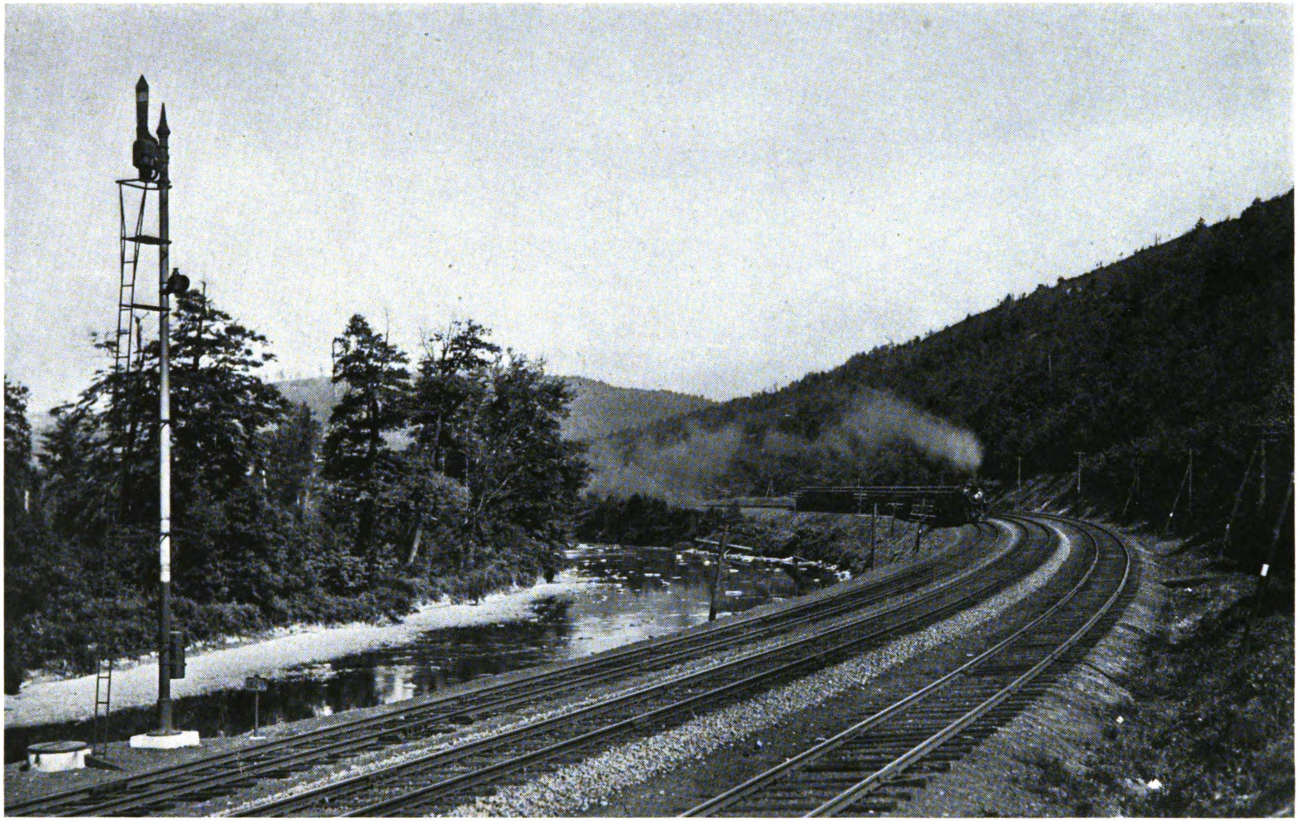

Model 2A Signal. Buffalo, Rochester & Pittsburgh Ry.

GRS

Model 2A Signal

Bulletin 115 C
March
1914

GENERAL RAILWAY SIGNAL COMPANY
ROCHESTER, N.Y.
QUALITY

New York
Liberty Tower Building
55 Liberty St.

Chicago
Peoples Gas Building
122 So. Michigan Ave.

San Francisco
Monadnock Building
681 Market St.

Canadian Agency
General Railway Signal Company
of Canada, Limited
Lachine, P. Q. Winnipeg, Man.

Australasian Agency
R. W. Cameron & Company
Sydney, N. S. W. Australia
16 Spring Street

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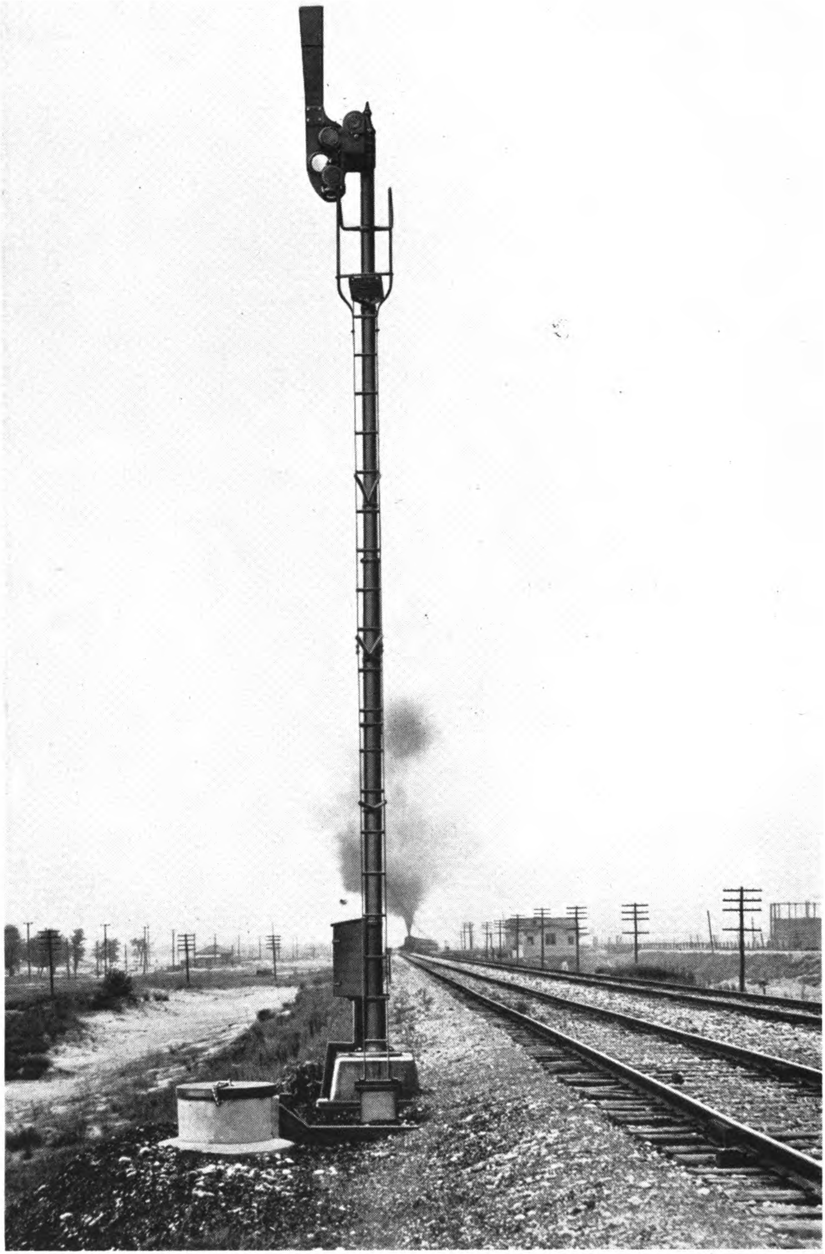
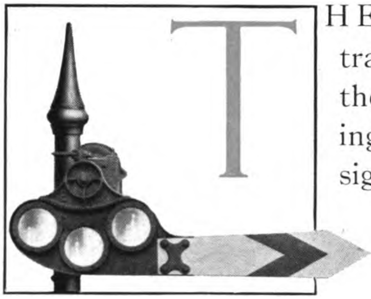


Model 2A Signal. Baltimore & Ohio R. R.

INTRODUCTION

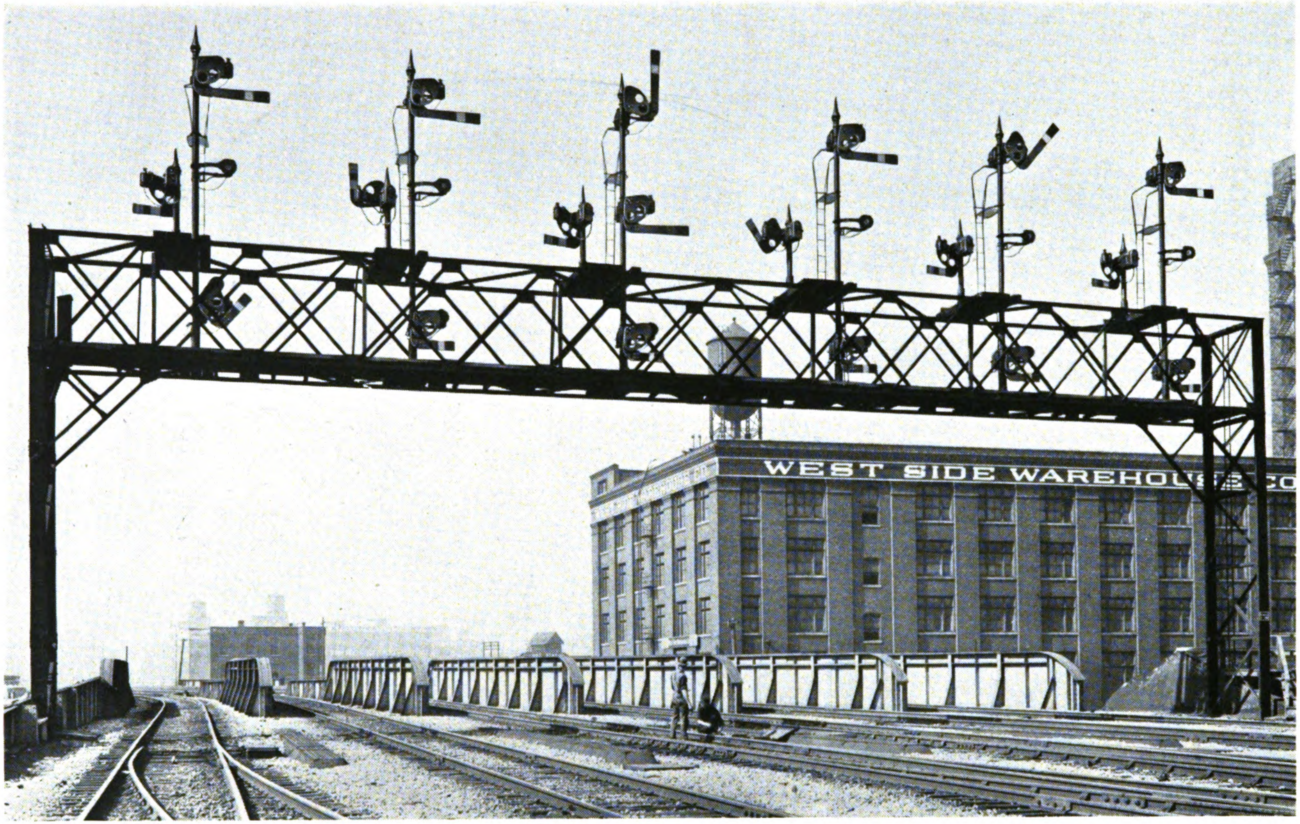


THE rapid development of railway traffic has created a demand for the power signal in block signaling and interlocking. The power signal has also been developed to meet the increasing requirements and today is an important factor in the safe and economical operation of railway trains.

In blocking or spacing trains, the power signal in connection with a track circuit, automatically indicates the presence of a train in the block, a misplaced switch or a broken rail; in routing or switching trains, in connection with electric interlocking, the power signal under control of a leverman, and track circuit also when desired, may be located at any distance from the interlocking tower so that the limits of the interlocking plant are unrestricted; and as a distant signal, in connection with a mechanical interlocking plant, the power signal may be located at a sufficient distance from the home signal to afford proper braking distance for high speed trains.

Since the invention of the closed track circuit in 1872 the power signal has passed through successive stages of development: from the clockwork disc to the electro-pneumatic semaphore; from the electro-pneumatic semaphore to the enclosed disc; from the enclosed disc to the electro-gas semaphore; and finally to the highly perfected electric motor semaphore.

The principal objections to former types of power signals were: first, the operation of the mechanisms was unreliable; second, the high cost of maintenance and


WEST SIDE WAREHOUSE CO

Model 2A Signals. Chicago Terminal, Chicago & Northwestern Ry.

operation; third, in the case of electro-pneumatic and electro-gas signals, the inconvenience and additional expense of supplying two kinds of energy, electricity and compressed air or gas.

The superior advantages of a semaphore signal operated by an electric motor were so apparent that, for the past twenty years or more, signal engineers have confined their efforts to the perfection of this type of power signal.

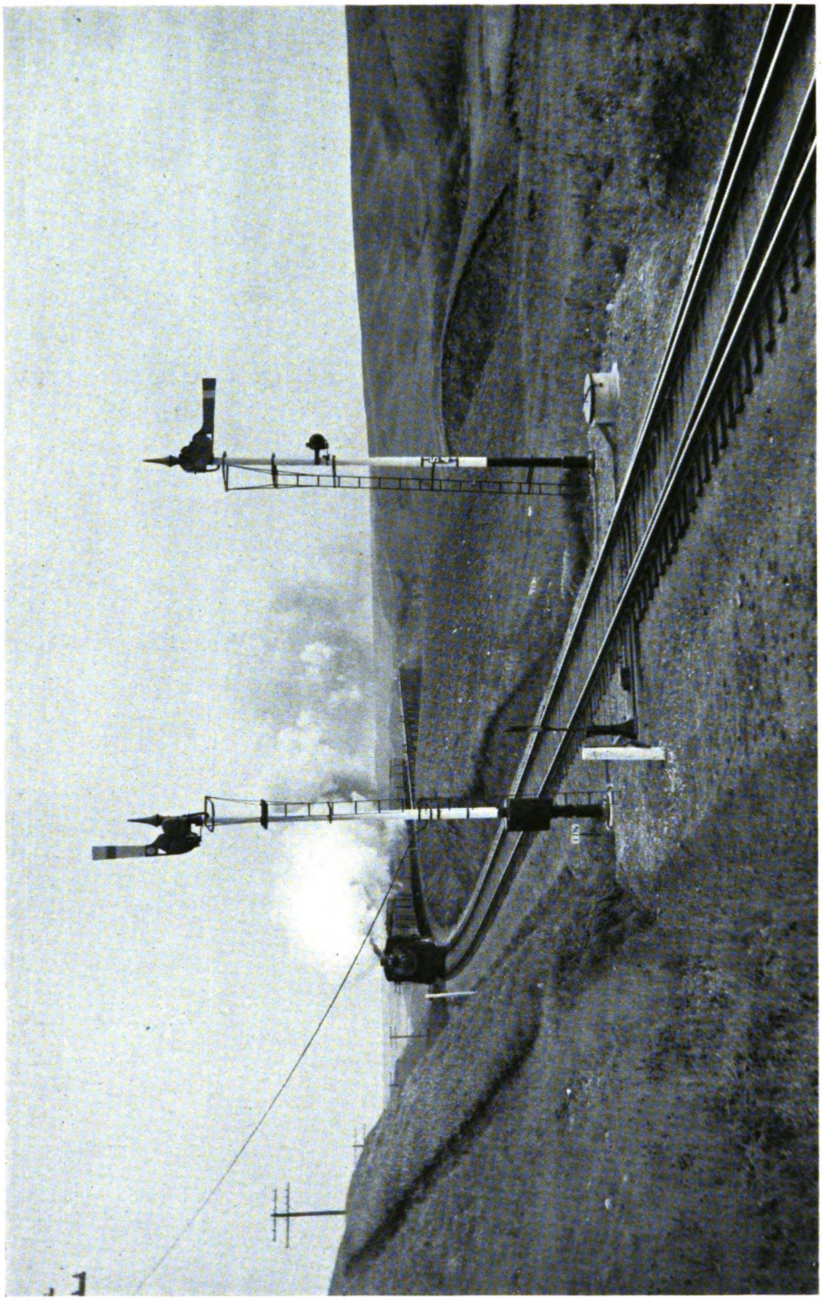
The General Railway Signal Company was one of the first manufacturers of signal appliances to design electric, motor operated, semaphore signals, many of which are still in service.

As the use of the power signal became more extensive there was urgent need of a mechanism adaptable to the various requirements, a mechanism that could be used as a high signal or dwarf signal, as an automatic, semi-automatic or non-automatic signal, a mechanism that would give the desired indications in the upper or lower right or left hand quadrant and could be arranged to operate on practically any voltage A. C. or D. C.

The Model 2A Signal was designed, in 1908, to provide a uniform signal mechanism for all requirements and embodied many new features in design and construction which were the result of the experience of many years in the manufacture of electric signals and from the record made by prior types of signals, under service conditions.

The main points of the Model 2A Signal, in addition to being adaptable to the various requirements, are:

First — The construction and arrangement of the several parts of the mechanism, providing for quick inspection and adjustments. The circuit controller is placed at the top of the mechanism where all contacts are visible and may be easily arranged or re-arranged to control the various circuits.



Model 2A Signals. Great Northern Ry.

SECOND — The direct connected mechanism, which insures the proper movement of the signal arm and reduces losses in mechanical energy, between motor and signal arm, to a minimum.

THIRD — The elimination of slot and dash pot, which materially increases the efficiency of the power signal and reduces the cost of maintenance, as the mechanism requires less attention.

FOURTH — The electrical means for holding the signal arm in any desired position.

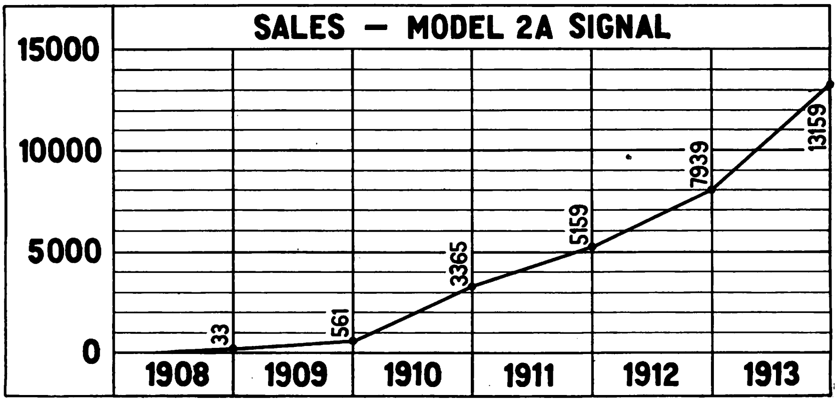
FIFTH — The electrical means for retarding the signal arm when going to the caution or stop position.

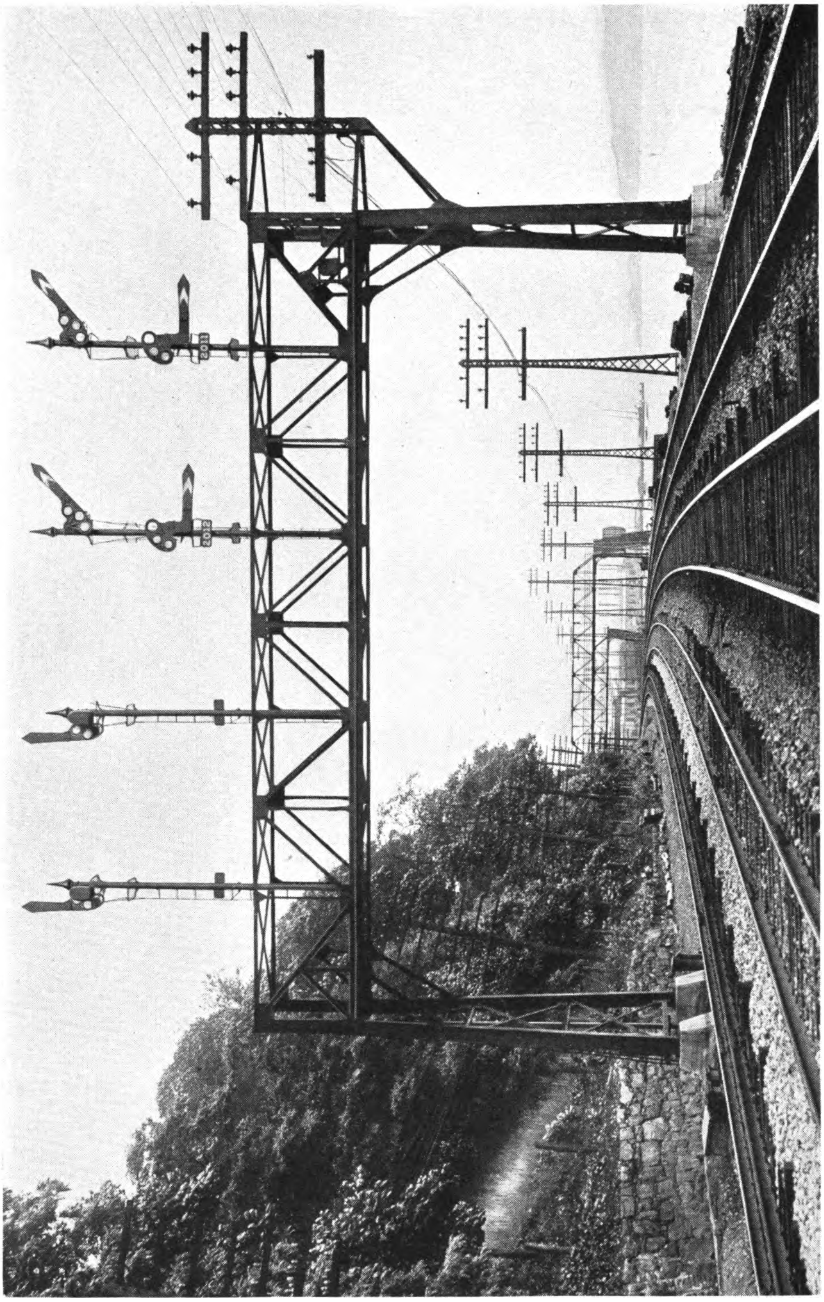
SIXTH — The low operating and holding current required, resulting in long life of battery.

SEVENTH — The short time it takes for the motor to clear the signal.

EIGHTH—The facility [illegible]pplying a Model 2A mechanism to a mechanical [illegible]nal, thereby converting the mechanical signal into a power signal.

There is no better basis for judging the merits of a power signal than the extent to which it is used. The following diagram shows the total number of Model 2A Signals that have been ordered previous to January 1, 1914, by eighty-eight railroads.





Model 2A Signals. New York Central R. R.

ADAPTABILITY OF THE MODEL 2A SIGNAL MECHANISM

Application:

Ground . .
Bridge. . .
Bracket . . } Signal.
Suspended .
Dwarf . . .

Control:

Automatic.
Semi-Automatic.
Non-Automatic.

Operation:

10 to 650 volts D. C.
55 to 220 volts A. C. 25 or 60 cycles.
Low Operating Current—2.2 amperes for 10 volt D. C. Mechanism.
Low Holding Current—0.018 amperes for 10 volt D. C. Mechanism.
Clearing Time—10 seconds for 10 volt D. C. Mechanism.

Indication:

Dynamic.
Battery.

Aspect:

Upper Right or Left-hand Quadrant.
Lower Right or Left-hand Quadrant.
Two or Three Positions.
Any Angular Movement.

There is no slot.
There is no dash-pot.

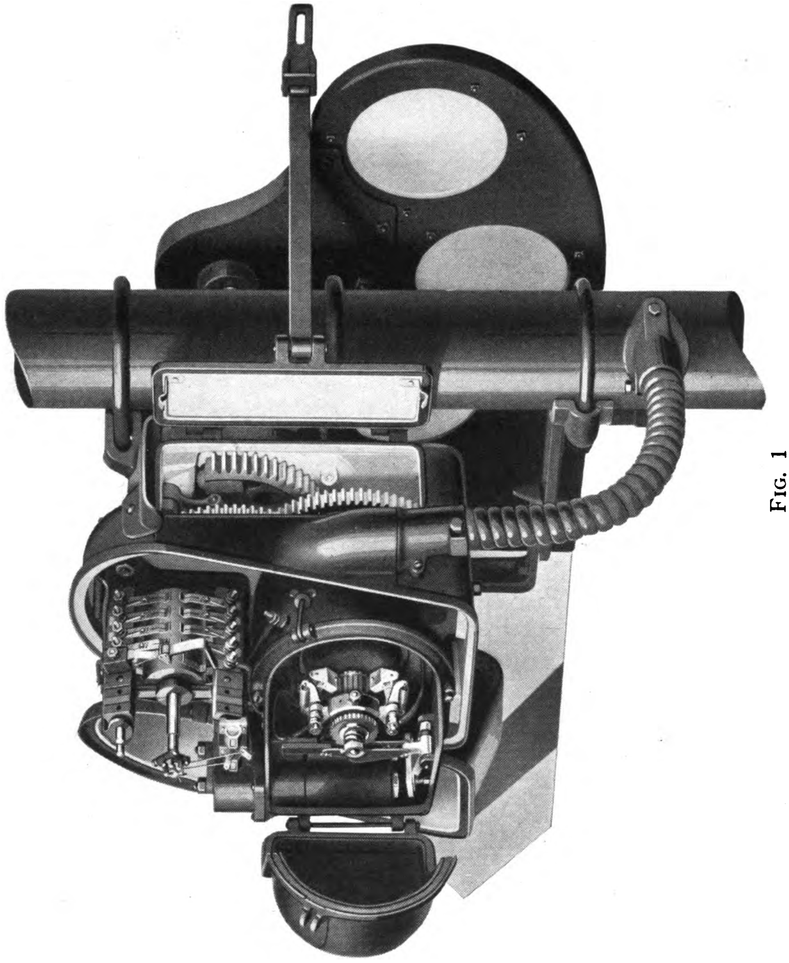


Fig. 1
Model 2A Signal

MODEL 2A SIGNAL

THE Model 2A Signal is primarily a top of mast mechanism but is also constructed as a base of mast mechanism.

Mechanical efficiency and the consensus of opinion among signal engineers favor the top of mast mechanism as in this mechanism the motor shaft is directly connected to the semaphore shaft. Another point in favor of the Model 2A top of mast mechanism is that it can be used wherever a power signal is required — as a ground, bridge, bracket, suspended or dwarf signal. The base of mast mechanism is restricted to the use of a one or two-arm ground, bridge or bracket power signal.

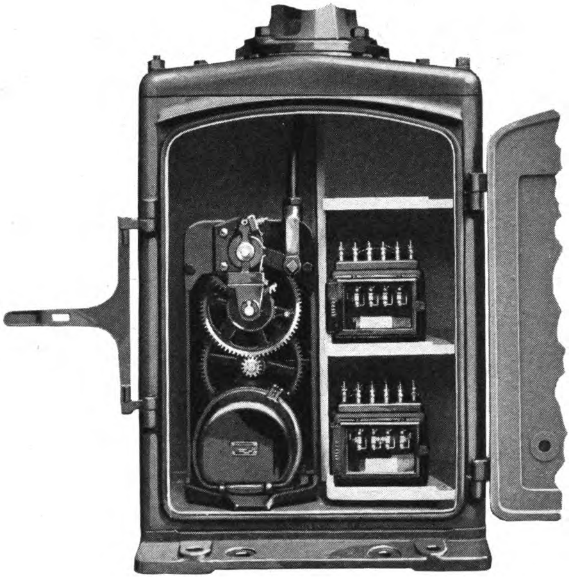


Fig. 2
Model 2A. Base of Mast Mechanism

Fig. 1 shows a Model 2A top of mast mechanism and Fig. 2 a Model 2A base of mast mechanism. The mechanisms are practically the same but the arrangement of the parts is different.

The Model 2A Signal Mechanism comprises the following main parts: high torque, low speed motor with retaining mechanism, train of gears, driving shaft and coupling, clamp bearing and spectacle shaft, circuit controller and a cast-iron case or housing. There is no slot nor dash-pot.

The motor operates in a dust-proof case in the lower part of the mechanism case and is directly connected to the spectacle shaft by means of the train of gears and the coupling. The front part of the motor case opens so that the motor can be examined when an inspection is made. There are several types of motors for the various conditions of high and low voltage, A. C. and D. C. automatic, semi-automatic and non-automatic signals, which are described in detail in the Model 2A Pamphlet 2019. There is one feature that is common to all D. C. motors: the signal arm in going from the proceed to the stop position causes the motor to rotate in a reverse direction,

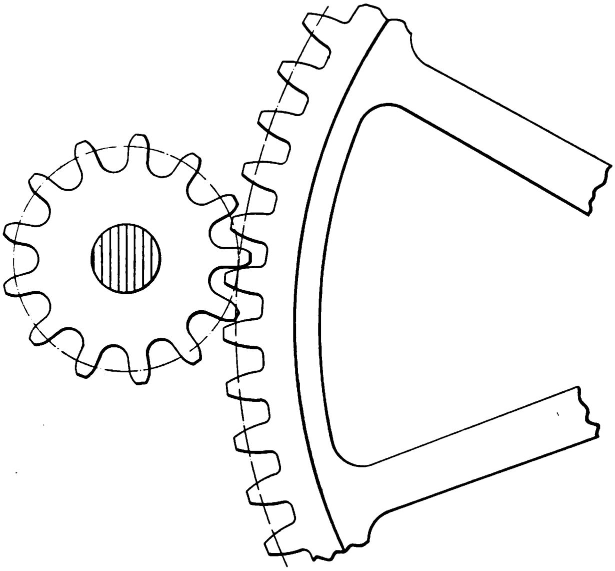


Fig. 3
Clearance of Gears

generating a current, which effectively checks the motion of the signal arm when the motor is shunted through a snubbing resistance, just before the blade comes to the caution or stop position. This method of retarding the motion of the signal arm is far superior to the old dash-pot and eliminates the chance of imperfect operations from defective dash-pots. A friction clutch between the motor and its driving pinion protects the motor and gearing from sudden strains.

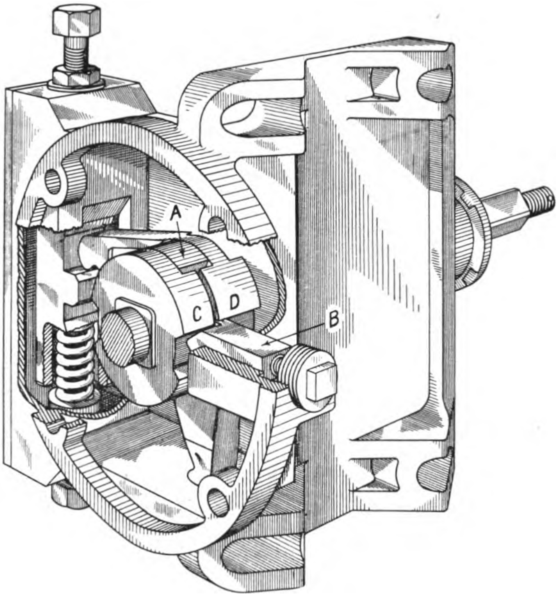


Fig. 4
Coupling

The train of gears is placed in a compartment in the back part of the case. The ratio of the gearing is such that thirty revolutions of the armature move the signal arm from the stop to the proceed position. The gear teeth are heavy and there is ample clearance between the teeth, as shown in Fig. 3, to insure free movement of the gears, under all conditions.

The driving shaft and the spectacle shaft are connected by means of the coupling, shown in Fig. 4, to provide for any variation in the alignment of the two shafts, and to insure free movement of the shafts. The coupling also provides a means for locking the signal in the stop position, preventing the operation of the signal, except in the proper manner. This is accomplished by means of a dog B, Fig. 4, which normally engages the notches in the two discs of the coupling. The part of dog B that engages the notch in disc D is square and the notch is also square,

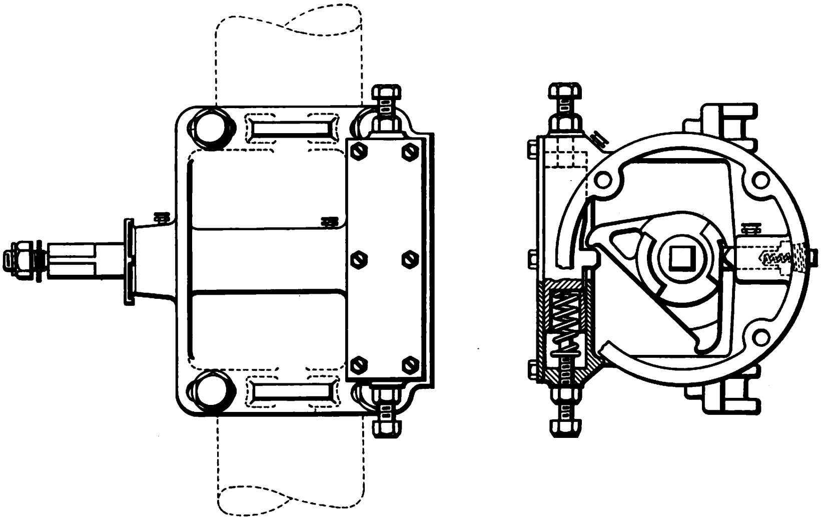


Fig. 5
Clamp Bearing with Adjustable Spring Stop

but the part of dog B that engages the notch in disc C is beveled and the notch is also beveled. There are a few degrees lost motion between discs C and D so that when the motor rotates the shaft the beveled notch of disc C engages the beveled part of dog B, forcing the dog outward so that the square part of dog B clears the square notch in disc D. The spectacle shaft cannot be turned from outside the mechanism as the square part of dog B obstructs any movement of disc D.

The mechanism case is bolted to a clamp bearing, Fig.

5, which is clamped to the signal pole by means of two "U" bolts. With this arrangement it is a simple matter to convert a mechanical signal into a power signal. The spectacle shaft extends through the clamp bearing and an adjustable spring stop, shown in Fig. 5, limits the travel of the signal arm, serves as a buffer and affords a means for adjusting the position of the signal arm so that the full movement is from horizontal to vertical and vice versa.

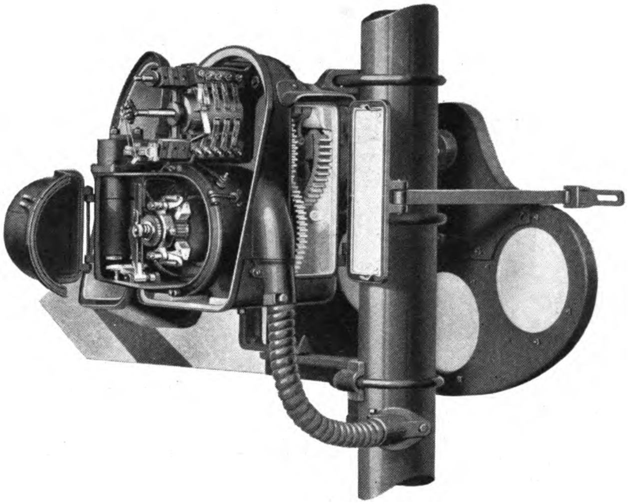
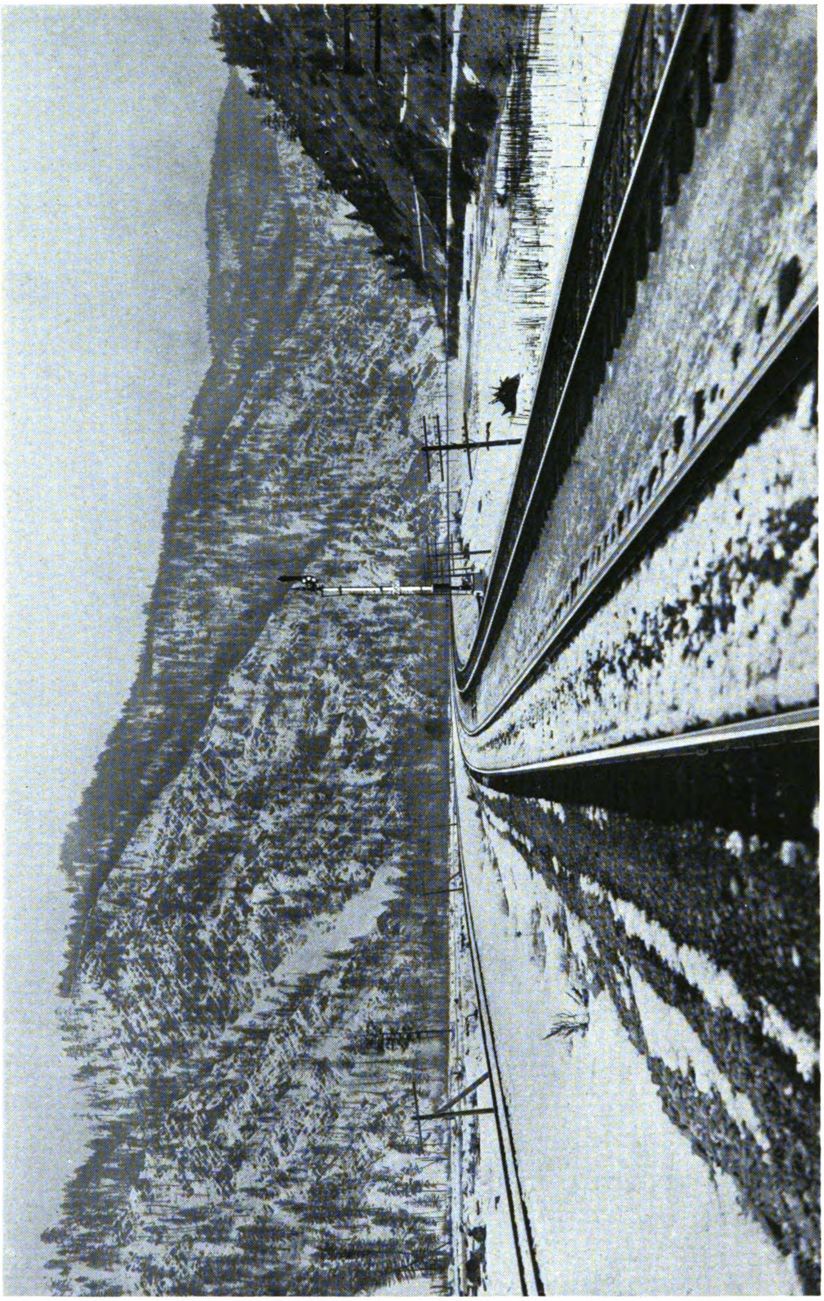


Fig. 6
Model 2A Signal

The circuit controller, shown in Fig. 6, is the brain of the Model 2A mechanism, as the operation of the motor and signal is controlled through this unit. The design of this circuit controller appeals strongly to signalmen as all parts are visible and accessible and there are no parts of the mechanism in the way to interfere with the free use of pliers and wrenches when there are connections or adjustments to be made.

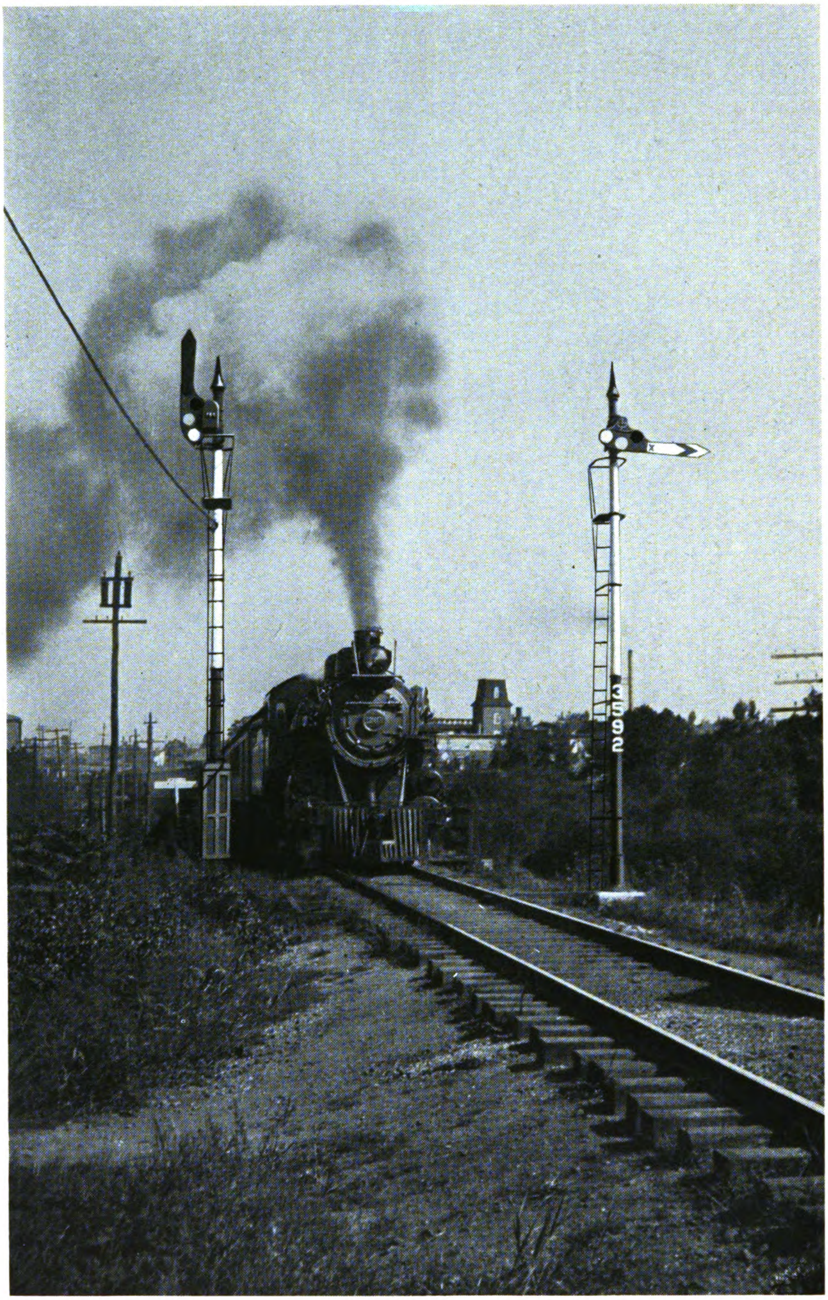
The circuit controller consists of a frame which carries a hardwood cylindrical drum on which the contact plates are mounted; adjustable contact fingers, with an arrange-



Model 2A Signal. Northern Pacific Ry.

ment for locking them in proper position; an attachment for producing snap contacts, when required; and segmental gears, by means of which the movement of the main shaft is transmitted to the circuit controller. There is space for a maximum of fourteen contacts, each of which can be adjusted to make or break at any position of the signal arm. There is provision for a maximum of four snap contacts which are used to control the operating and indicating circuits of dynamic indication mechanisms and where a contact performs the function of a pole changer. The other circuits have drag contacts.

The mechanism case is conveniently arranged for inspection of all parts of the mechanism. The front part of the case forms a door, which, when opened, exposes the circuit controller and the motor case, as shown in Fig. 6. The train of gears are accessible through a door in the side of the mechanism case. Both doors, when closed, are held firmly in place by means of a wrought iron strap and a special attachment. A hasp is provided for a padlock, which when in place locks both doors. The operating and control wires are lead into the mechanism through a flexible conduit or in some cases the several wires are taped together forming a cable which is securely taped to a bushing, where it protrudes from the signal mast, and to a coupling, where it enters the mechanism. The taped cable is then painted with electric lacquer or P. & B. paint and any openings are filled with waste. In either case the mechanism is practically air-tight and free from any action of the elements, dust, cinders and smoke.



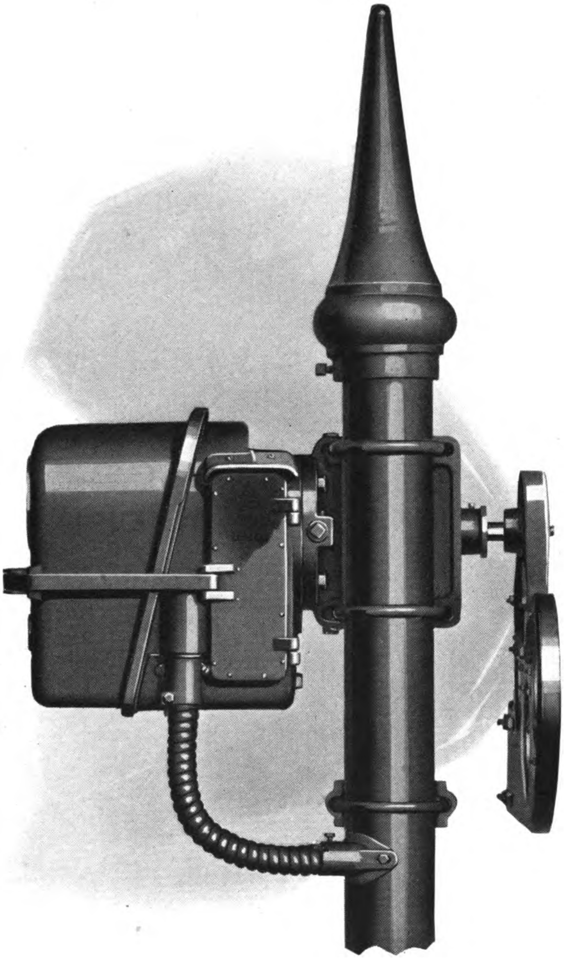
A. C. Model 2A Signals. Southern Ry.

The Model 2A Signal provides a uniform signal for the various requirements of block signaling and interlocking — Adaptability.

All parts of the mechanism are designed to withstand the natural wear and tear and are protected from the elements, smoke and dust — Efficiency.

The mechanism operates on a small current and requires little attention other than an occasional oiling — Economy.

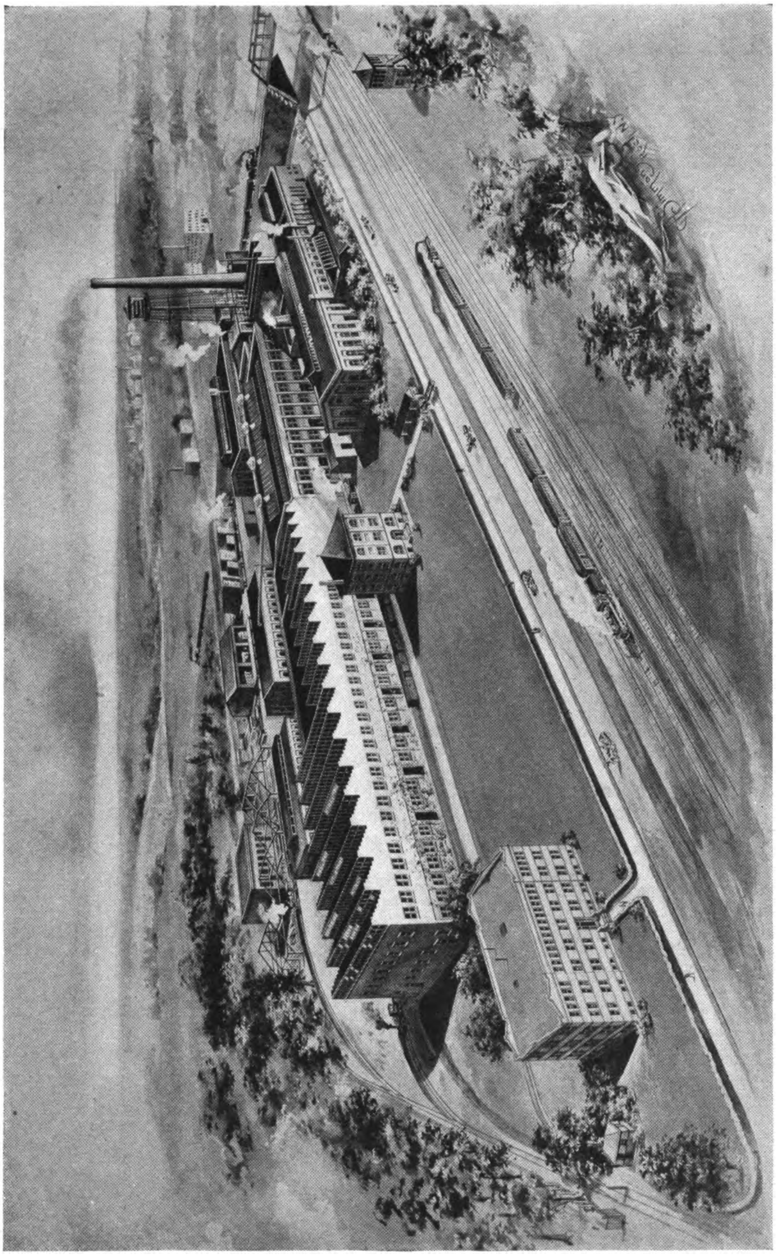
There are thirteen thousand Model 2A Signals in service on eighty-eight railways in the United States and Canada, purchased during the past five years — There is a Reason.



Side View Model 2A Signal

RAILWAYS USING G. R. S. MODEL 2A SIGNALS

Arizona & New Mexico Ry.
Atchison, Topeka & Santa Fe Ry.
Aurora, Elgin & Chicago, R. R.
Baltimore & Ohio R. R.
Baltimore & Sparrows Point R. R.
Boston & Albany R. R.
Buffalo, Rochester & Pittsburgh Ry.
Canadian Pacific Ry.
Chesapeake & Ohio Ry.
Chattanooga Station Co.
Chicago & Alton R. R.
Chicago, Burlington & Quincy R. R.
Chicago & Eastern Illinois R. R.
Chicago Great Western Ry.
Chicago, Indianapolis & Louisville Ry.
Chicago & Northwestern Ry.
Chicago, Milwaukee & St. Paul Ry.
Chicago, Rock Island & Pacific Ry.
Chicago, St. Paul, Minneapolis & Omaha Ry.
Chicago & Western Indiana R. R.
Cleveland, Cincinnati, Chicago & St. Louis Ry.
Cincinnati, Hamilton & Dayton Ry.
Cincinnati, New Orleans & Texas Pacific Ry.
Cumberland Valley R. R.
Delaware & Hudson Co.
Delaware, Lackawanna & Western R. R.
Detroit River Tunnel Co.
Duluth & Iron Range R. R.
Duluth, Winnipeg & Pacific Ry.
Elgin, Joliet & Eastern Ry.
Erie R. R.
Essex Terminal Ry.
Galveston, Harrisburg & San Antonio Ry.
Grand Trunk Railway System
Great Northern Ry.
Houston Belt & Terminal Ry.
Houston & Texas Central R. R.
Illinois Central R. R.
Illinois Northern Ry.
Kansas City Terminal Ry.
Kentucky & Indiana Terminal R. R.
Lake Erie & Western R. R.
Lake Shore & Michigan Southern Ry.
Lake Superior, Terminal & Transfer Ry.
Lehigh & Hudson River Ry.
Lehigh Valley R. R.
Lehigh Valley Transit Co.
Long Island R. R.
Louisville & Nashville R. R.
Louisiana Railway & Navigation Co.
Michigan Central R. R.
Milwaukee, Sparta & Northwestern Ry.
Minneapolis, St. Paul & S. St. M. Ry.
Missouri, Kansas & Texas Ry.
Missouri Pacific Ry.
Mobile & Ohio R. R.
Morgan's, Louisiana & Texas R. R. & S. S. Co.
New York Central & Hudson River R. R.
New York, New Haven & Hartford R. R.
New York State Railways
New York, Susquehanna & Western R. R.
Norfolk & Western Ry.
Northern Central Ry.
Northern Electric Ry.
Northern Pacific Ry.
Oregon Electric Ry.
Pacific Electric Ry.
Pennsylvania Lines, West of Pittsburgh
Peoria & Pekin Union Ry.
Pere Marquette R. R.
Pennsylvania R. R.
Philadelphia, Baltimore & Washington R. R.
Philadelphia & Western Ry.
Pittsburgh, Cincinnati, Chicago & St. Louis Py.
Pittsburgh Coal Company of Wisconsin
Pittsburgh & Lake Erie R. R.
Puget Sound Electric Ry.
San Francisco, Oakland & San Jose Ry.
Southern Pacific Co.
Southern Ry.
Spokane & Inland Empire R. R.
St. Louis, Peoria & Northwestern Ry.
Toledo & Ohio Central Ry.
Toronto, Hamilton & Buffalo Ry.
United Railways Co.
Washington, Baltimore & Annapolis Electric R. R.
Washington, Baltimore & Annapolis Elec. R. R.
Washington Water Power Co.
Wichita Valley Ry.



Main Office and Plant, General Railway Signal Company, Rochester, N. Y., U. S. A.

The Caxton Company
Cleveland—Rochester

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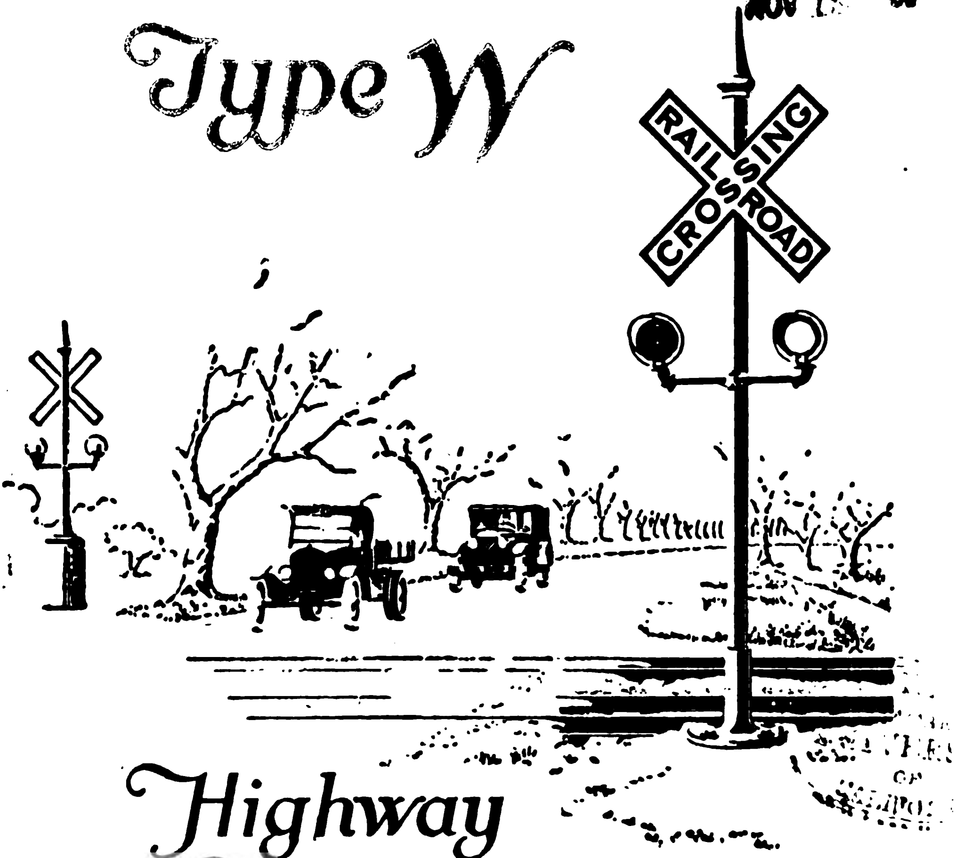
General railway signal co.
Bulletin

157

NOV 15 30

Type W


RAILROAD
CROSSING

Highway Crossing Signal

THE TYPE W HIGHWAY CROSSING SIGNAL

BULLETIN 157
MARCH, 1928

GENERAL RAILWAY SIGNAL COMPANY
ROCHESTER, N.Y.

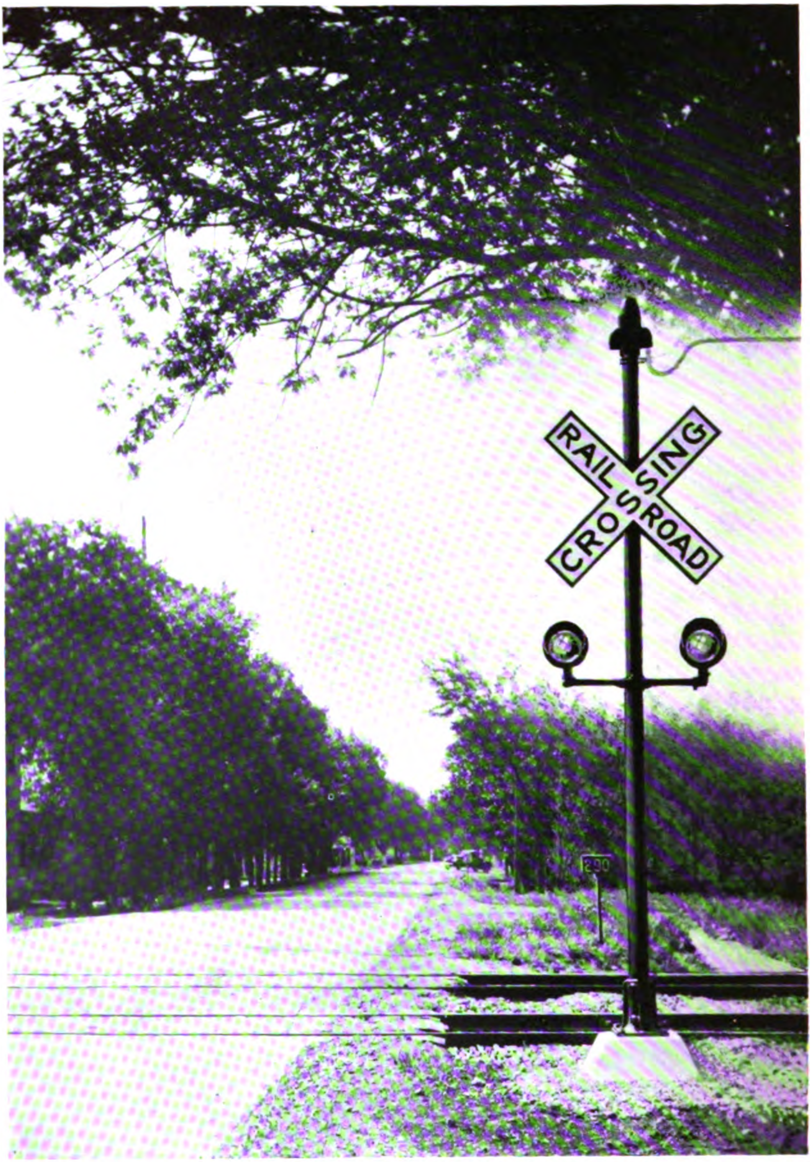

RAILROAD
CROSSING
290

FIGURE 1. TYPE W FLASHING LIGHT HIGHWAY CROSSING SIGNAL, ELGIN, JOLIET & EASTERN RAILWAY. A SIMILAR SIGNAL, NOT SHOWN, IS LOCATED ON OTHER SIDE OF HIGHWAY.

The Type W Highway Crossing Signal

THE improvement of many highways and the increase in automobile traffic is making unusual demands on railroads for protection at highway crossings. The G-R-S Type W Highway Crossing Signal provides a very effective and dependable means of securing this protection at low cost.

The design of this signal, as well as its operation has been made unusually simple and it may be installed in a number of different ways to meet the requirements of individual locations.

During recent years the Flashing Light Type of Highway Crossing Signal has come into extensive use. It gives an indication that is distinctive in character from those employed in street traffic signaling. It meets the requirements of Public Service Commissions in most of the States of the United States and has the approval of the Signal Section of the American Railroad Association.

Figure 1 is a typical installation of the Type W Signal arranged as a Flashing Light Signal. It consists of a durable cast-iron sign lettered "Railroad Crossing" and two light-units spaced two feet, six inches apart horizontally on a cross-arm mounted to a four inch post. The light-units are controlled in a very simple and dependable manner through the contacts of a direct current, slow release, flashing relay to flash alternately at the approximate rate of 32 times per minute. The indication displayed presents the appearance of an intense red light swinging first to one side and then the other—a danger signal that is well understood.

When located in the center of the highway, the signal is usually mounted on a substantial concrete base which projects about two and one half feet above the road surface and serves as a buffer for the protection of the signal.

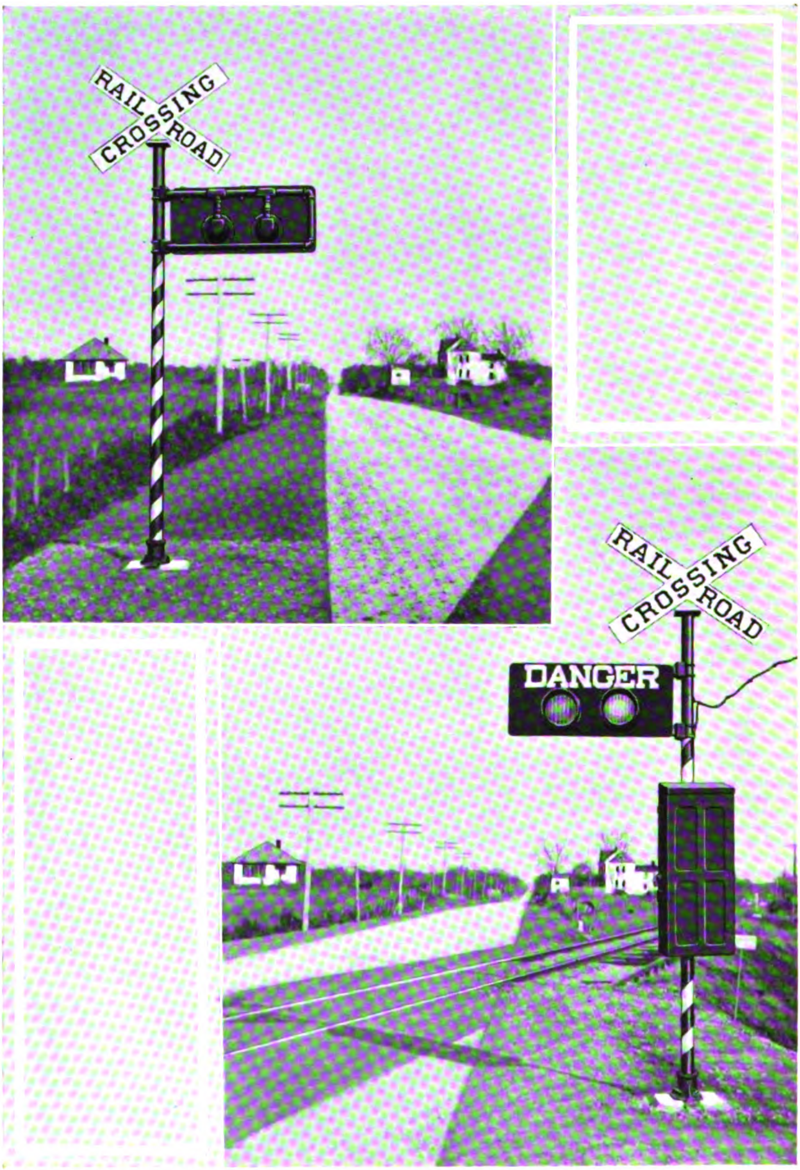

RAIL ROAD
CROSSING
RAIL ROAD
CROSSING
DANGER

FIGURE 2. TYPE W HIGHWAY CROSSING SIGNAL, SOUTHERN RAILWAY. THIS INSTALLATION EMPLOYS A NON-FLASHING RED INDICATION FOR "STOP" AND A GREEN INDICATION FOR "GO."

Suitable markers are employed to indicate the location of the signal at night. The reflector marker, as shown in Figure 9, is recommended for such locations.

If side lights are desired so that the operation of the signal can be observed from the track, the signal units can be so furnished.

Contrary to the idea that signals used for the protection of highway traffic at railroad crossings should give indications which are distinctive in character, some signal engineers and others believe that the indications of such signals should conform with those in general use for the control of traffic at important street intersections.

The general use of traffic signals which give a red indication for "stop" and a green indication for "go," has caused the public to become thoroughly familiar with the meaning of these color indications.

The Type W Signal arranged to give a red indication for "stop" and a green indication for "go" is being used effectively to protect highway traffic at a number of railroad crossings, one of which is shown in Figure 2. In this signal, a black background bearing the word "DANGER" is provided for the two Type W Light-Units which are spaced one foot, three inches apart horizontally or vertically, as desired. The background and units are supported by a simple pipe bracket which is clamped to a three inch post. The light units are equipped with 8⅜″ standard doublet lenses as illustrated in Figure 7.

The signal normally displays a green indication when no train is approaching and a red indication upon the approach of a train. Plate H2905, included as a part of this bulletin, shows the construction of the signal in detail and gives order references for it.

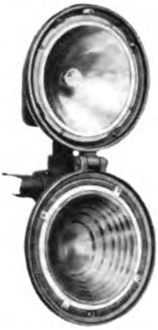


FIGURE 3. TYPE W LIGHT UNIT, FRONT DOOR OPEN

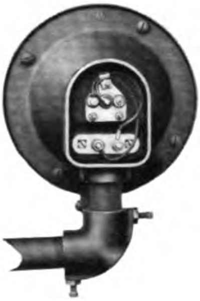


FIGURE 4. TYPE W LIGHT UNIT, REAR DOOR OPEN

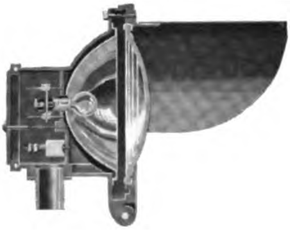


FIGURE 5. SHOWING CONSTRUCTION OF UNIT HAVING REFLECTOR AND 8⅜″ ROUNDEL. FOR MOUNTING ON TOP OF CROSS ARM.

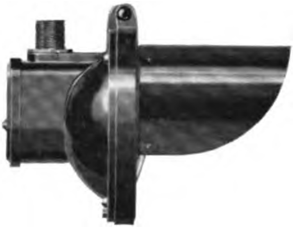


FIGURE 6. SHOWING UNIT FOR SUSPENDING FROM CROSS ARM.

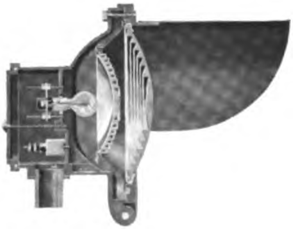


FIGURE 7. SHOWING CONSTRUCTION OF UNIT WITH 8⅜″ DOUBLET LENS. FOR MOUNTING ON TOP OF CROSS ARM.

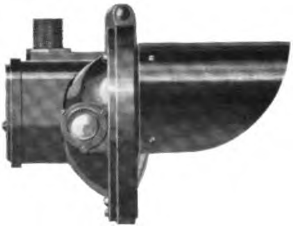


FIGURE 8. TYPE W LIGHT UNIT WITH SIDE LIGHTS. FOR SUSPENDING FROM CROSS ARM.

Light-Units

EACH light-unit is easily adjusted in either the horizontal or vertical plane. The main door of the unit opens in front giving access to the lamp, reflector and lens, as shown by Figure 3. A small door in the rear provides easy access to the terminals and adjustable lamp receptacle mounting, as shown in Figure 4. The units may be supplied for mounting on the cross-arm as shown by Figure 1 or they can be suspended from the cross-arm.

Optical Construction of Light-Units

THE TYPE W LIGHT-UNIT may be supplied with the optical arrangement illustrated in Figure 5, with the lamp filament located at the focal point of a high grade glass reflector which projects the light beam through an 8⅜″ red Spredlite roundel, or the unit may be supplied with the arrangement illustrated in Figure 7, with the lamp filament placed at the focal point of an 8⅜″ doublet lens consisting of an inner colored lens and an outer Spredlite clear lens.

Either of these optical arrangements may be used where the signal is to be operated as a flashing signal but if the signal is to give a red indication for stop and a green indication for proceed, the doublet lens combination is recommended due to its freedom from phantom indications.

The light beam from either of the arrangements described has a spread of 15° to each side or a total spread of 30°. (Beam spread is understood to refer to the point at the angle mentioned where the intensity of the beam is 50% of the axial beam under normal conditions and is for the purpose of covering the approach to the crossing with a good indication.)

Side lights, when specified, will be supplied in units having either the reflector or the doublet lens. A unit equipped with side lights is illustrated in Figure 8.

Lamps

THE Type W Signal employs the S-11 bulb, single contact, bayonet base type of lamp having a single concentrated filament. These lamps are especially made for signal service and are furnished in ratings suitable for use with either a 6-8 volt storage battery or a 12 volt storage battery as specified.

We recommend that lamps be burned slightly under rated voltage as this increases the life of the lamp and provides a light beam of ample intensity for a good signal indication.

Reflector Marker Unit

THIS UNIT provides an effective marker for signals located in the center of the highway. No lamp is required. The light from the headlights of an approaching automobile is reflected back to the driver so that the entire area of the unit appears filled with light. Each marker consists of one, two or three reflectors, as specified, with the necessary brackets for either mounting to the base of the post or to the post just above the base. Each reflector is an independent unit, approximately 4″ x 11″ in size, consisting of thick moulded glass with its support and protecting mesh

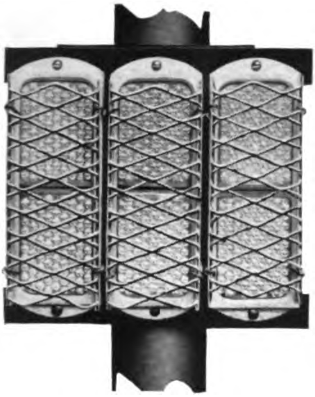


FIGURE 9. THREE-UNIT REFLECTOR MARKER

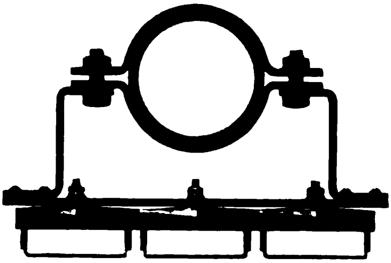


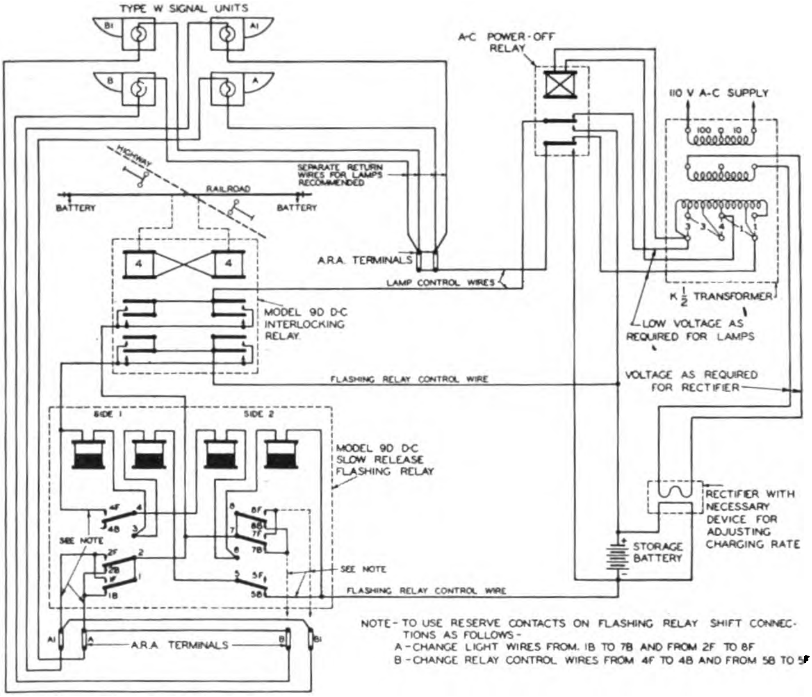
FIGURE 10. MOUNTING BRACKET FOR REFLECTOR MARKER

guard. The glass is especially moulded to present a reflecting surface which is effective, even when the marker is approached from a considerable angle. Reflectors are furnished clear, yellow or red as desired.

Circuits

TYPICAL circuits for the control of flashing light highway crossing signals on single track are shown by Figures 11 and 12. Each piece of apparatus used in the circuits is labeled and the relays, transformers, etc., are illustrated and described in the following pages.

Where alternating current is available, a very economical and dependable control is obtained by the use of circuit Figure 11, which employs a storage battery on trickle charge from alternating current to operate the flashing relay, the lamps being fed normally from the Alternating


TYPE W SIGNAL UNITS
B1
A1
B
A
A-C POWER-OFF RELAY
110 V A-C SUPPLY
100
10
HIGHWAY
RAILROAD
BATTERY
BATTERY
SEPARATE RETURN WIRES FOR LAMPS RECOMMENDED
4
4
A.R.A. TERMINALS
LAMP CONTROL WIRES
MODEL 9D D-C INTERLOCKING RELAY.
3
3
4
1
1
K ½ TRANSFORMER
LOW VOLTAGE AS REQUIRED FOR LAMPS
FLASHING RELAY CONTROL WIRE
VOLTAGE AS REQUIRED FOR RECTIFIER
SIDE 1
SIDE 2
MODEL 9D D-C SLOW RELEASE FLASHING RELAY
4F
4
4B
3
SEE NOTE
2F
2
2B
1F
1
1B
8
8F
8B
7
7F
7B
6
SEE NOTE
5
5F
5B
FLASHING RELAY CONTROL WIRE
RECTIFIER WITH NECESSARY DEVICE FOR ADJUSTING CHARGING RATE
STORAGE BATTERY
+
-
A1
A
A.R.A. TERMINALS
B
B1

NOTE- TO USE RESERVE CONTACTS ON FLASHING RELAY SHIFT CONNECTIONS AS FOLLOWS-
A-CHANGE LIGHT WIRES FROM. 1B TO 7B AND FROM 2F TO 8F
B-CHANGE RELAY CONTROL WIRES FROM 4F TO 4B AND FROM 5B TO 5F

FIGURE 11. TYPICAL CIRCUIT FOR THE CONTROL OF FLASHING LIGHT HIGHWAY CROSSING SIGNALS ON SINGLE TRACK WHERE ALTERNATING CURRENT IS AVAILABLE.

Current and cut-over to the storage battery by a power-off relay upon failure of the A-C supply.

Where alternating current is not available, the circuit shown in Figure 12 is recommended. This circuit employs a storage battery on trickle charge from a primary battery, the flashing relay being controlled directly from the storage battery, and the lamps being fed from the same source.

The relay housing shown as a part of Type W Signal Complete, Plate H2903, Figure C, makes a very neat and

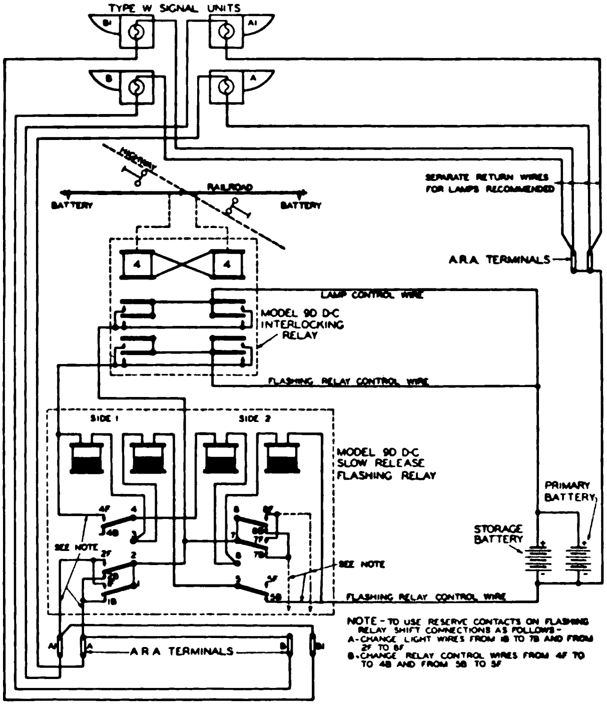

TYPE W SIGNAL UNITS
B1
A1
B
A
HIGHWAY
RAILROAD
BATTERY
BATTERY
SEPARATE RETURN WIRES FOR LAMPS RECOMMENDED
A.R.A. TERMINALS
4
4
LAMP CONTROL WIRE
MODEL 9D D-C INTERLOCKING RELAY
FLASHING RELAY CONTROL WIRE
SIDE 1
SIDE 2
MODEL 9D D-C SLOW RELEASE FLASHING RELAY
PRIMARY BATTERY
STORAGE BATTERY
SEE NOTE
SEE NOTE
FLASHING RELAY CONTROL WIRE
A1
A
A R A TERMINALS
B
B1
NOTE - TO USE RESERVE CONTACTS ON FLASHING RELAY SHIFT CONNECTIONS AS FOLLOWS -
A-CHANGE LIGHT WIRES FROM 1B TO 7B AND FROM 2F TO 8F
B-CHANGE RELAY CONTROL WIRES FROM 4F TO TO 4B AND FROM 5B TO 5F

FIGURE 12. TYPICAL CIRCUIT FOR THE CONTROL OF FLASHING LIGHT HIGHWAY CROSSING SIGNALS ON SINGLE TRACK WHERE ALTERNATING CURRENT IS NOT AVAILABLE.

satisfactory housing for the control apparatus. If it is desired to bring wires from a pole line into the top of the 4 inch post supporting the signal, the post is ordered the proper length equipped with cap, Figure 14, shown on this same plate. Where the signals are located in the center of the highway, it is usually more desirable to separate the relay case from the signal. Reference 9a, Plate H2903, will obtain the relay case only equipped with a cover plate.

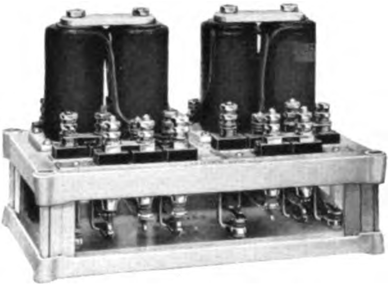


FIGURE 13. MODEL 9-D, SLOW RELEASE, D-C FLASHING RELAY.

Model 9-D Direct-Current Flashing Relay

THE Model 9-D Flashing Relay is of high quality, equal in every respect to other relays manufactured by this company for the control of railway signals. It provides a simple and dependable means of interrupting the current to the lamps of the flashing light signal. The application of the relay is shown in the typical circuits, Figures 11 and 12, and its construction is described as follows:

Two slow-releasing direct-current relays are mounted on the same base as shown in Figure 13, the coils of one being energized through the contacts of the other to produce alternate operation of each relay. With the coils regularly furnished, approximately 32 operations or flashes per minute are produced on the operating voltage specified.

The resistances are as follows:

OPERATING VOLTAGE	RESISTANCE PER SIDE OF RELAY	RESISTANCE PER COIL
10 to 12	1000	500
8 to 10	800	400
6 to 8	540	270
4 to 6	300	150

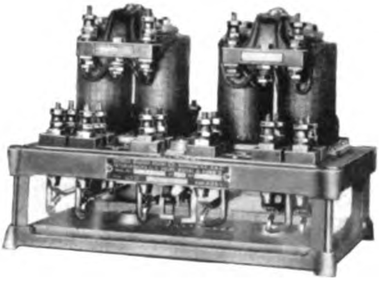


FIGURE 14. MODEL 9-D INTERLOCKING RELAY, D-C.

The contacts regularly supplied are intended for the interrupted breaking of current to low voltage lamps (not to exceed 30 volts). Two contacts are connected in multiple for each lamp circuit, one contact being graphite to graphite which makes first and breaks last, taking the arc, the other contact being silver to silver, to insure low contact resistance for the lamp circuit.

The relay is furnished with a complete set of reserve contacts which may be placed in service by shifting connections as indicated on typical circuits, Figures 11 and 12.

Simply order Model 9-D Direct-Current Flashing Relay and specify voltage on which the relay is to operate.

Model 9-D Interlocking Relay

THE Model 9-D Direct-Current Interlocking Relay is designed for the control of highway crossing signals on single track. It consists of two standard relays mounted side by side on the same base, standard armatures being used and interlocked with each other through a simple and dependable arrangement.

The operation is described as follows:

1st Normally, the coils for both relays are energized and all front contacts are closed.

2nd The dropping of the armature of either relay will close its back contacts and place the interlocking parts in position to prevent the back contacts of the other relay from closing when its armature drops.

3rd With energy restored to the coils of the first relay, its front contacts close and the back contacts open while the armature of the second relay is locked in mid position, i.e., with both front and back contacts open.

4th When the energy is then restored to the second relay with the first relay energized, the interlocking arrangement is restored to normal and is in position for operation from either relay as before.

STANDARD RESISTANCES IN OHMS				
2	9.2	126	430	960
4	16.0	194	500	1360
6	55.0	280	640	

The Model 9-D Interlocking Relay has a contact capacity of four front and back contacts on each side. Dependent front and back, or independent front or back contacts may be located in any contact space. Front contacts are regularly furnished copper-carbon post to silver finger and back contacts, silver finger to silver post.

Simply order Model 9-D Direct-Current Interlocking Relay, specifying the resistance of relay and contacts required.

The Type H Power-Off Relay

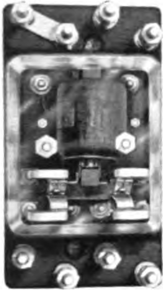


FIGURE 15. TYPE H POWER-OFF A-C RELAY.

THE TYPE H RELAY was developed for the specific purpose of feeding signal lamps normally from an A-C source of supply and of cutting in a storage battery or other reserve supply when the A-C source is interrupted. The application of this relay is shown in typical circuit, Figure 11.

The Type H Relay has a moulded porcelain base with terminal heads and wiring deeply recessed, assuring freedom from grounds. The laminated armature structure is free moving and self aligning, which insures noiseless operation. The contact equipment consists of two substantially constructed dependent front and back contacts. The relay is completely enclosed in a dust-proof moulded glass cover.

Simply order Type H Power-Off Relay, specifying voltage and frequency of A-C Current and voltage on which signal lamps are to operate.

Type K½ Transformer Storage Battery and Rectifier

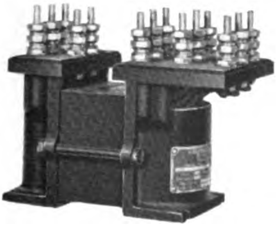


FIGURE 16. TYPE K½ TRANSFORMER.

THE TYPE K½ TRANSFORMER is employed in the control of highway crossing signals where storage battery is charged thru a rectifier as shown in Figure 11. It is a small air-cooled transformer 4½" wide by 5⅜" long, having a 110-volt primary and one or two secondary windings with taps of the proper voltage for charging the storage battery and feeding the lamps.

In ordering the Type K½ Transformer, Storage Battery and Rectifier give the following information:

(*a*) Voltage and frequency of alternating current.
(*b*) Rating of lamps to be used in signal.
(*c*) Ampere-hour capacity of Storage Battery.

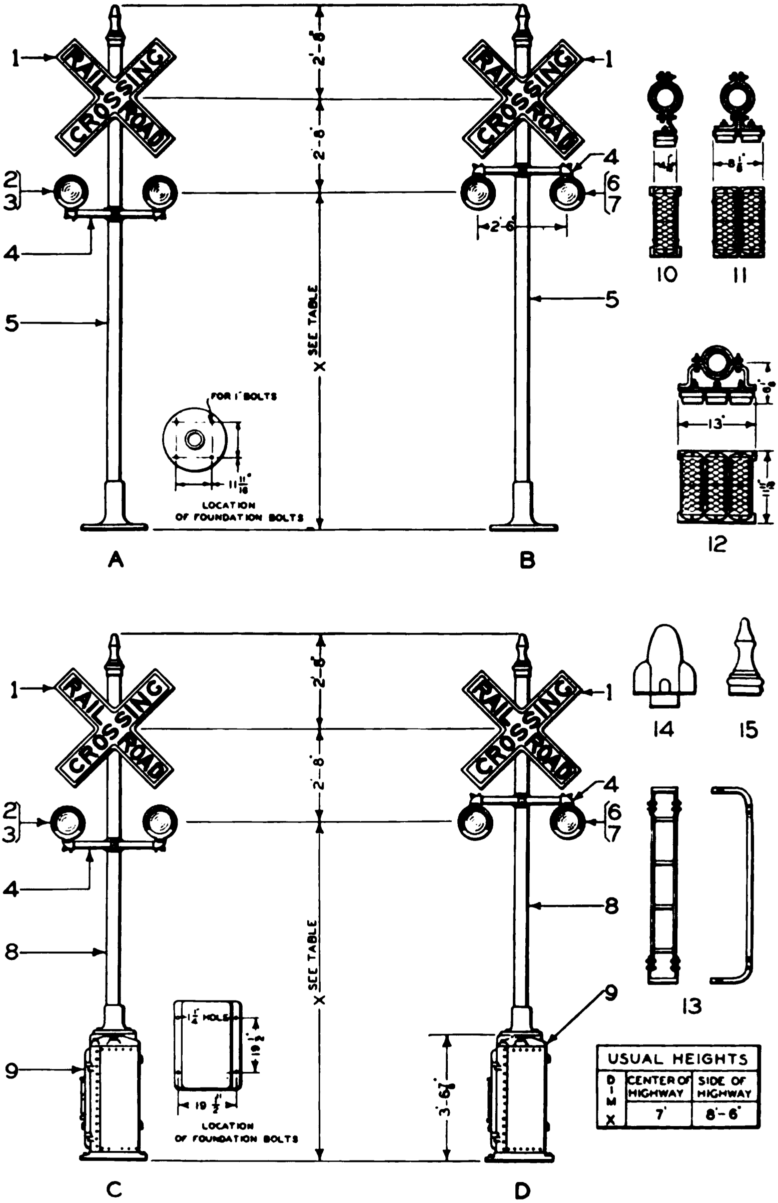
Other Accessories for Highway Crossing Signals

Direct-Current Relays for track or line circuits. See G-R-S Catalog, E Volume 1, Section E.

Alternating-Current Relays for track or line circuits. See G-R-S Catalog, E Volume 4, Section N.

Relay Housings in wood or iron for any grouping of relays and other equipment. See G-R-S Catalog, E Volume 1, Section E.

CATALOG SECTION


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
RAIL ROAD
CROSSING
2'-8"
2'-8"
X SEE TABLE
2'-6"
FOR 1" BOLTS
11 11/16"
LOCATION OF FOUNDATION BOLTS
8 1/8"
13"
1 1/4" HOLE
19 1/2"
19 1/2"
3'-6 7/8"
A
B
C
D

USUAL HEIGHTS		
DIM	CENTER OF HIGHWAY	SIDE OF HIGHWAY
X	7'	8'-6"

TYPE W HIGHWAY CROSSING SIGNALS

TYPE W HIGHWAY CROSSING SIGNALS

Note: Side lights shown in Figure 8, page 6, are furnished only when specified.

If markers shown in Figures 10, 11 and 12, this plate, are desired same must be ordered separately.

Ladder shown in Figure 13, this plate, will be furnished only when specified.

If it is desired to bring line wires into top of signal, specify length of 4″ post required and order cap, Figure 14, this plate.

Lamps are not included with signals complete. Order separately, giving voltage of storage battery to be used with signal.

Drawing references are shown for convenience in checking shipping lists and invoices

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type W Flashing-light Highway Crossing Signal Complete, as shown, having units equipped with 8⅜″ red spredlite roundels and reflectors. See Figures 4 and 5 on page 6 for construction of unit. Specify dimension X......................	
A1	as above, except having units equipped with 8⅜″ red doublet lenses. See Figure 7 on page 6, for construction of unit....................	
A2	same as Figure A1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal.................	
B	Type W Flashing-light Highway Crossing Signal Complete, as shown, having units equipped with 8⅜″ red spredlite roundels and reflectors. See Figs. 4 and 5 on page 6 for construction of unit. Specify dimension X......................	
B1	as above, except having units equipped with 8⅜″ red doublet lenses. See Figs. 6 and 7 on page 6 for construction of unit....................	
B2	same as Fig. B1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
C	Type W Flashing-light Highway Crossing Signal Complete mounted on relay case as shown. Light units are equipped with 8⅜″ red spredlite roundels and reflectors. See Figures 4 and 5 on page 6 for construction of unit. Specify dimension X................................	

TYPE W HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

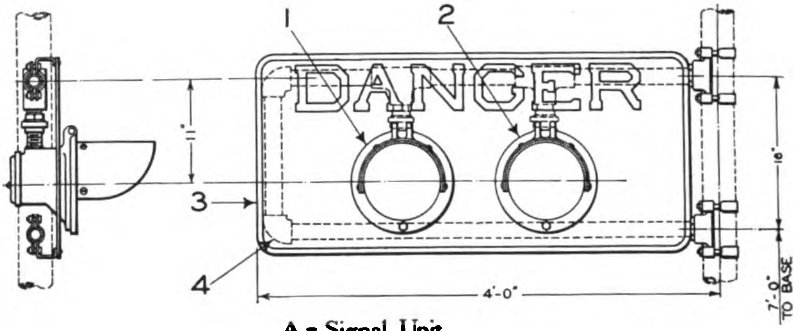
FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
C1	as above, except having units equipped with 8⅜″ red doublet lenses. See Figs. 6 and 7 on page 6, for construction of unit	
C2	same as Fig. C1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
D	Type W Flashing-light Highway Crossing Signal Complete mounted on relay case as shown. Light units are equipped with 8⅜″ red spredlite roundels and reflectors. See Figs. 4 and 5 on page 6 for construction of unit. Specify dimension X.	
D1	as above except having units equipped with 8⅜″ red doublet lenses. See Figs. 6 and 7 on page 6, for construction of unit	
D2	same as Fig. D1, except signal is furnished with one unit for giving a green indication and the other unit a red indication. This signal is not operated as a flashing signal	
1	Railroad Crossing Sign, cast iron, has raised border and letters which are painted black on a white background unless otherwise specified. Includes two U bolts for mounting to 4″ pipe	20896-5 31359
2	Type W Color-light Signal Unit Complete for mounting on top of cross-arm, equipped with 8⅜″ dia., red spredlite roundel and reflector	53125-1 Gr. 1
3	Type W Color-light Signal Unit Complete for mounting on top of cross-arm, equipped with a doublet lens combination of an inner, 5½″ dia., red lens and an outer 8⅜″ dia., clear spredlite lens	53125-1 Gr. 2
3a	as above, except inner lens green in place of red.	
4	Cross-Arm Complete, for supporting light units.	48870-5 Gr. 1
5	Mast Complete of 4″ pipe, with base and cap as shown. Specify length	
6	Type W Color-light Signal Unit Complete for suspending from cross-arm, equipped with 8⅜″ dia., red spredlite roundel and reflector	

TYPE W HIGHWAY CROSSING SIGNAL

Drawing references are shown for convenience in checking shipping lists and invoices

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
7	Type W Color-light Signal Unit Complete for suspending from cross-arm, equipped with a doublet lens combination of an inner 5½" dia., red lens and an outer 8⅜" dia., clear spredlite lens.	
7a	as above, except inner lens green in place of red.	
8	Mast Complete, of 4" pipe, with base and cap as shown for mounting on top of relay case. Specify length.	
9	Relay Case Complete as shown, equipped with three shelves	
9a	as above, except with cover for use without mast.	
10	Reflector Unit Complete, with one yellow reflector and clamps for attaching to 4" pipe. When specified clamps can be furnished for mounting to base.	53276 Gr. 3
10a	as above, except with red reflector	53276 Gr. 2
10b	same as Fig. 10, except with clear reflectors.	53276 Gr. 1
11	Reflector Unit Complete, with two yellow reflectors and clamps for attaching to 4" pipe. When specified clamps can be furnished for mounting to base.	53276-1 Gr. 3
11a	as above, except with red reflectors	53276-1 Gr. 2
11b	same as Fig. 11, except with clear reflector.	53276-1 Gr. 1
12	Reflector Unit Complete, with three yellow reflectors and clamps for attaching to 4" pipe. When specified clamps can be furnished for mounting to base.	53276-2 Gr. 3
12a	as above, except with red reflectors.	53276-2 Gr. 2
12b	same as Fig. 12, except with clear reflectors	53276-2 Gr. 1
13	Ladder Complete, as shown, with clamps for attaching to 4" pipe. Specify length	
14	Pinnacle and Cap, for use as wire inlet, for 4" pipe.	30391 36288
15	Pinnacle, as shown, for 4" pipe	1661

TYPE W TWO-INDICATION HIGHWAY CROSSING SIGNAL



A - Signal Unit

NOTE: References given below do not include posts, bases, relay cases or lamps for light units, which must be ordered separately.

See Catalog E, Volume 1, Plate E0701 for posts and bases, Plate E0903 for relay cases.

In ordering lamps give voltage of storage battery to be used with signal.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type W, Two-Indication, Highway Crossing Signal Unit Complete, consisting of two doublet lens light units, background, and pipe bracket with clamps for mounting to 3″ pipe, as shown. This signal unit is equipped for giving red and green indications.	
A1	as above, except for mounting to 4″ pipe.	
1	Type W Light-Unit Complete, equipped with an 8⅜″ doublet lens, consisting of an inner red lens and an outer spredlite clear lens.	53125-2 Gr. 3
2	Type W Light-Unit Complete, equipped with an 8⅜″ doublet lens, consisting of an inner green lens and an outer spredlite clear lens.	53125-2 Gr. 4
3	Background, black with the word "DANGER" and border painted in white.	49162-37
4	Bracket Complete, with clamps for mounting to 3″ pipe. Includes all fittings for attaching light units and background.	
4a	as above, except for mounting to 4″ pipe.	

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General Railway Signal Company

Rochester, New York

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122 South Michigan Avenue, Chicago, Illinois

PERSHING SQUARE BUILDING
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RAILWAY EXCHANGE BUILDING
611 Olive Street, St. Louis, Missouri

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Head Office, 9 Kingsway, London, W.C. 2

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GENERAL RAILWAY SIGNAL COMPANY
PTY. LTD.
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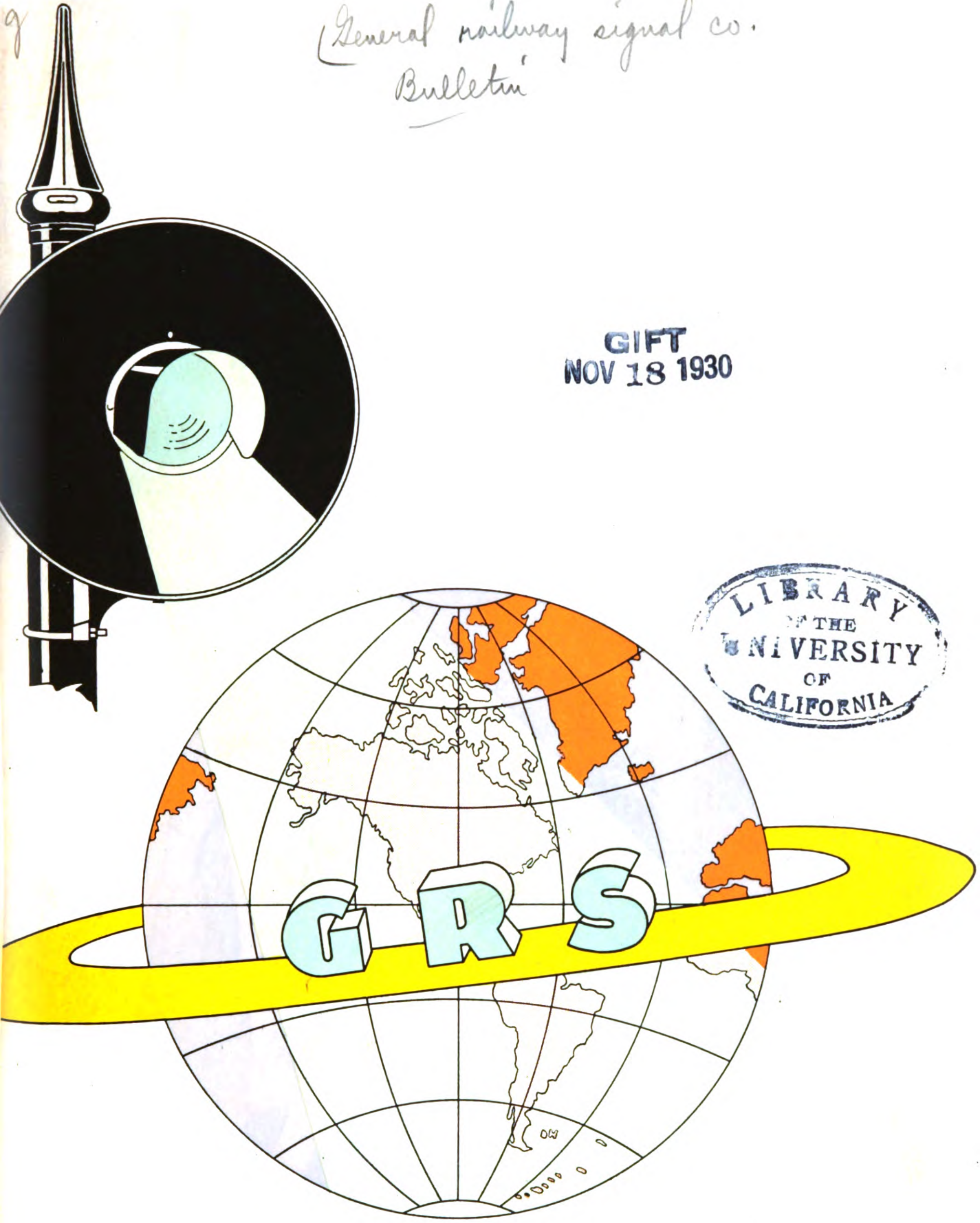

Signaling Progress

G-R-S
SIGNALING PROGRESS

An Exhibit at the

NATIONAL RAILWAY APPLIANCES
ASSOCIATION EXHIBITION
COLISEUM, CHICAGO

March 10 to 13, inclusive, 1930

ECONOMY in operation and facility of train movements are vitally affected by modern signal systems.

A visit to the G-R-S Exhibit will reveal the signaling progress made during the past year and show how these new and improved appliances and systems can benefit your road.

The following pages describe briefly the principal appliances and systems which will be on display.

Your presence will be highly appreciated.

GENERAL RAILWAY SIGNAL COMPANY
ROCHESTER, N. Y.

March 1, 1930 Bulletin 160

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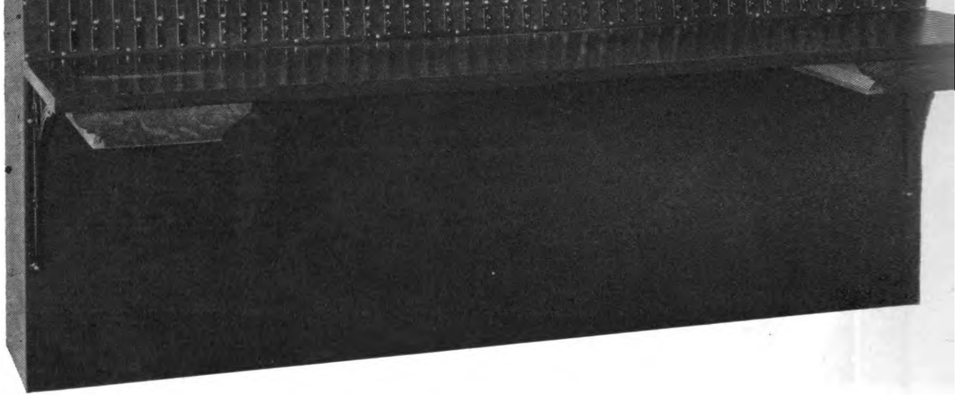


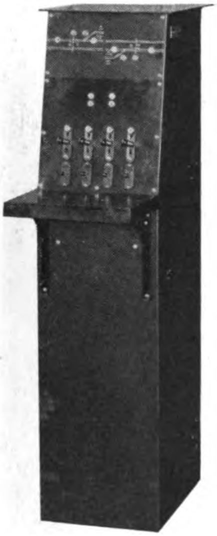
G-R-S CENTRALIZED TRAFFIC CONTROL SYSTEMS

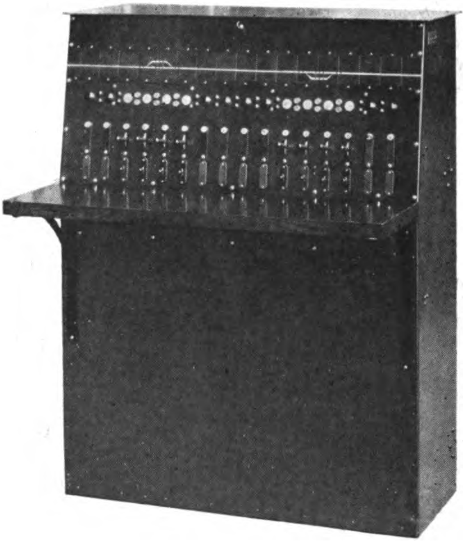
THE General Railway Signal Company pioneered in the development of Centralized Traffic Control and has available two principle systems to answer every requirement of train operation by signal indication.

One system utilizes an individual wire direct from the control machine to each controlled group. The other utilizes three wires extending the length of the installation to provide control and indication for all locations within the territory.

Both systems will be on display at the G-R-S Booth where our engineers will give you specific information relative to the operation and application of each.

The above machine controls 42 miles of busy single track on the Missouri Pacific Railroad.





REMOTE CONTROL

THIS new remote control system, which is based on the G-R-S Centralized Traffic Control System, provides a practical means, not previously available, of relieving operating conditions at small critical locations.

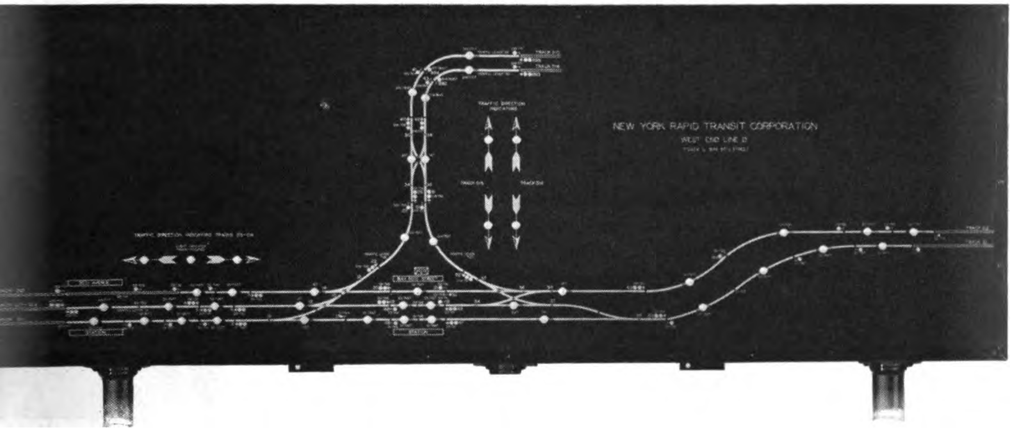
Control distances are practically unlimited.

Operating expenses can be reduced by controlling existing facilities from a distant point where an attendant is required for other duties.

G-R-S ELECTRIC INTERLOCKING

THIS system uses direct or alternating current for control, operation and indication of functions. It is equally suitable for the largest terminal or the smallest plant. The system, introduced in 1889, is now known universally for its economy, safety, speed, dependability and facility of operation.

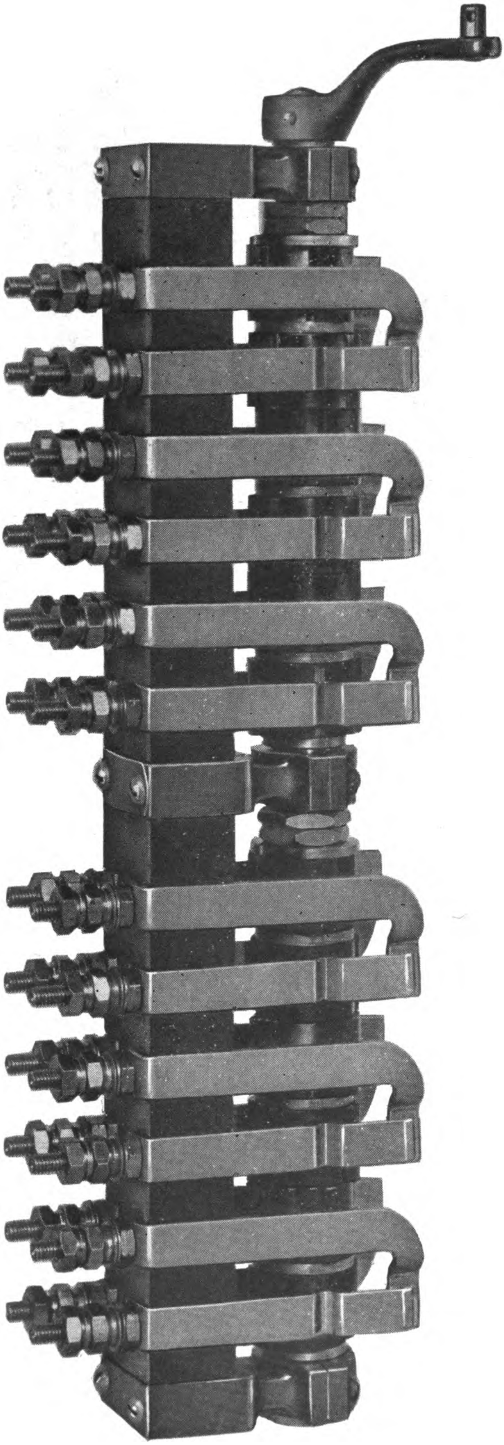
Among the many large terminal installations are the recent Buffalo Central Terminal and Cleveland Union Terminal totaling 928 lever-spaces and 576 lever-spaces respectively.


NEW YORK RAPID TRANSIT CORPORATION
WEST END LINE D

TYPE D ILLUMINATED TRACK DIAGRAM

A THIN, light-weight, more attractive, bakelite-impregnated panel in which the diagram, track-section colors, lettering, etc., are actually a part of the panel instead of being pasted upon it.

A permanent, waterproof diagram which requires no glass for its protection.



FINGER TYPE CONTACT ROTARY CIRCUIT CONTROLLER

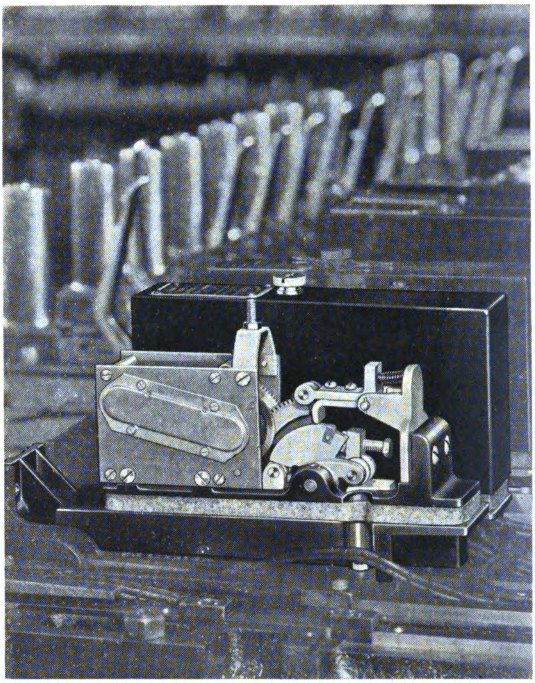
FINGER type contacts operated by individual commutators adjustable to obtain any contacting arrangement needed in interlocking practice.

LEVER TIME LOCK

AN improved Time Lock for electric interlocking levers.

All moving members are actuated by rollers.

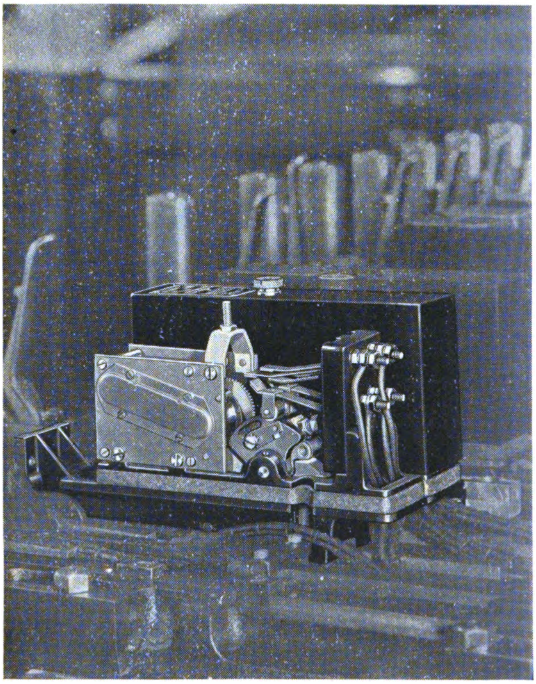
A sturdy clockwork mechanism adjustable 10 seconds to 1½ minutes.

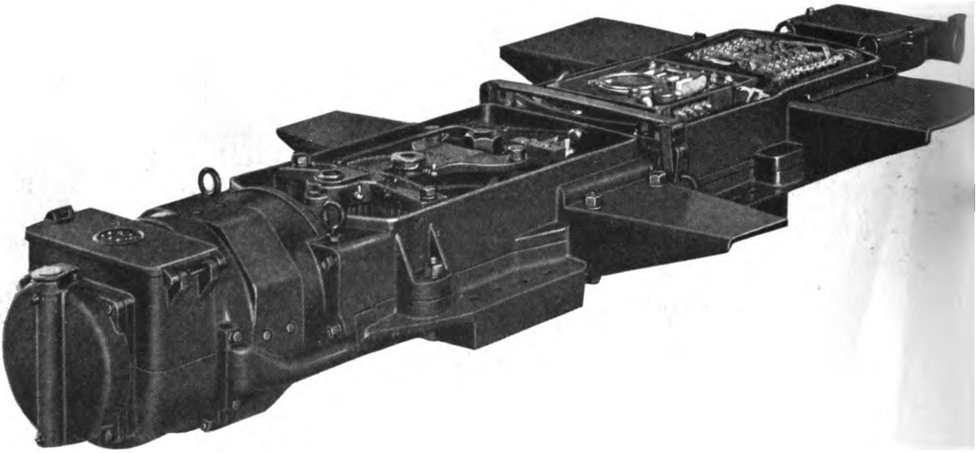


LEVER TIME CONTACTOR

A NEW Time Contactor having relay type contact fingers.

Two separate contacts are arranged to operate on two adjustable time intervals anywhere from 10 seconds to 2 minutes.



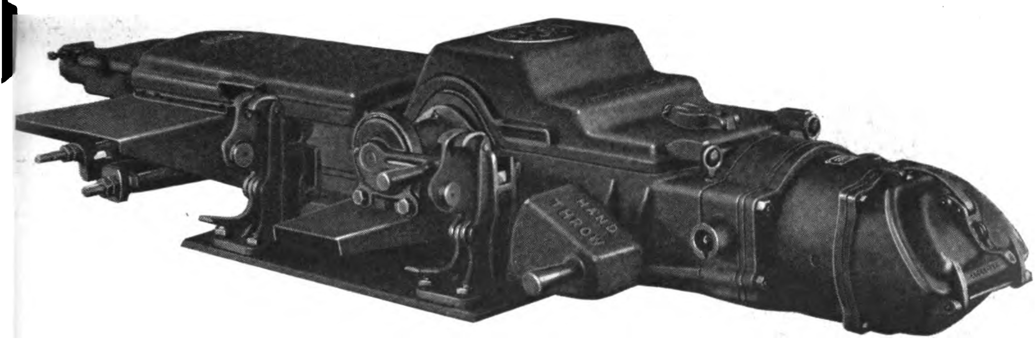


MODEL 5C SWITCH MACHINE

FOR the operation of adjacent or remotely located switches.

Similar in appearance and mechanical operation to our Model 5A, but provided with a resiliently mounted, built-in, circuit contactor and over-load circuit-breaker with automatic reset in lieu of the usual pole-changer movement.

Energy for operation is taken from two feeders or directly from a battery which may be of low or high voltage. The built-in contactor, which is controlled by either a high or low-voltage circuit over practically any line resistance, controls operating energy to the motor.



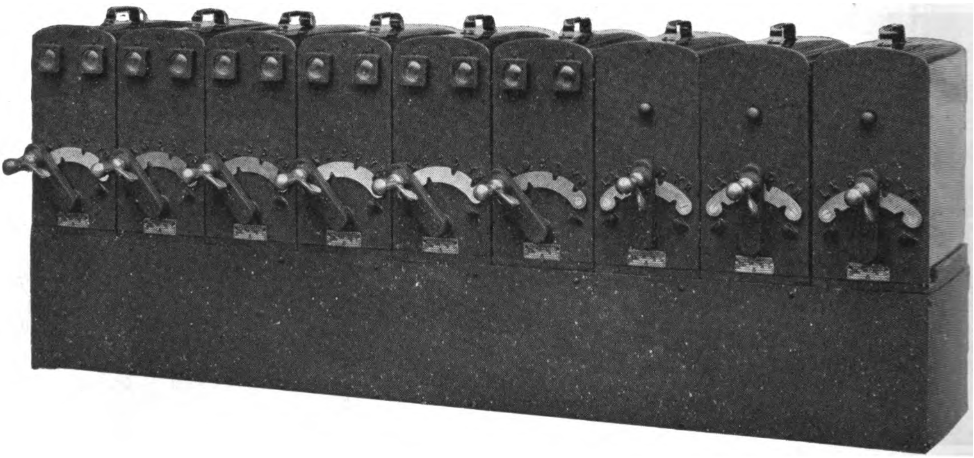
MODEL 5D SWITCH MACHINE

ESSENTIALLY the same as the Model 5C Switch Machine, described on the opposite page, but provided with a mechanism which allows operation either by electric power or by hand.

A small selector-lever transfers operation from electric power to manual power. The switch can then be operated by a hand-throw lever, familiar to all trainmen.

Its improved design allows hand operation in case of lock rod or other failure. Also no juggling is required between the selector and hand-throw lever to change from hand to power operation or vice versa.

This arrangement provides convenience when local switching is required and makes operation under a Centralized Traffic Control System very flexible.

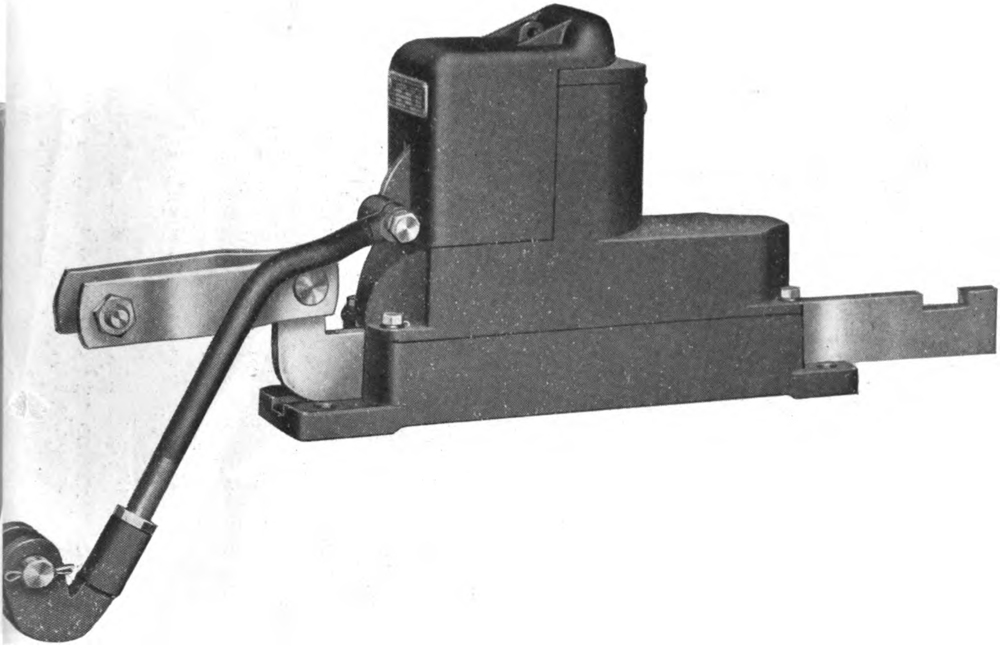


TYPE A TABLE INTERLOCKER WITH VERTICAL LOCKING

A NEWLY improved unit which has all the features of the former well-known design but provided with vertical locking accessible from the front.

Each unit is provided with a 16 contact circuit controller.

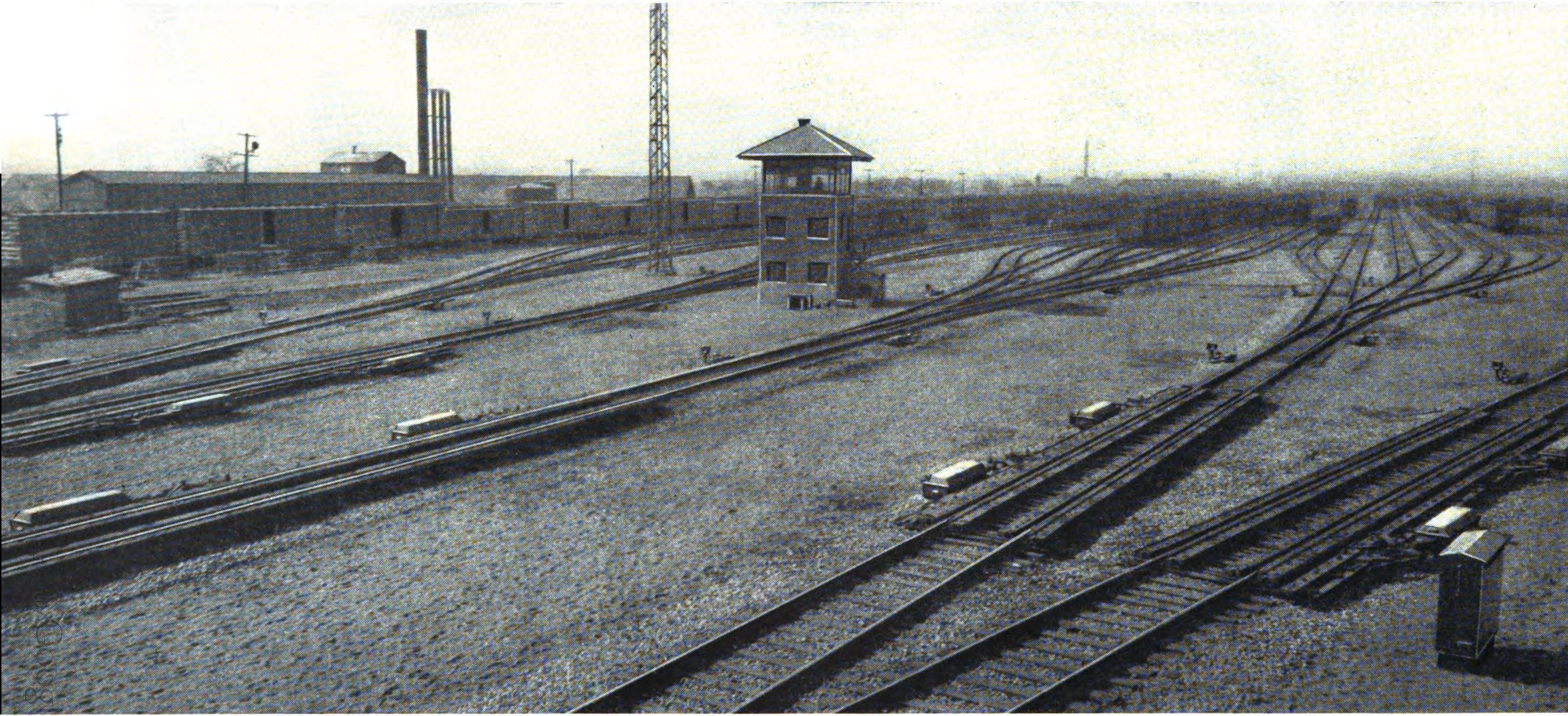
Adaptable for use where space is limited and when electric lever-locks and mechanical locking between levers are desired.



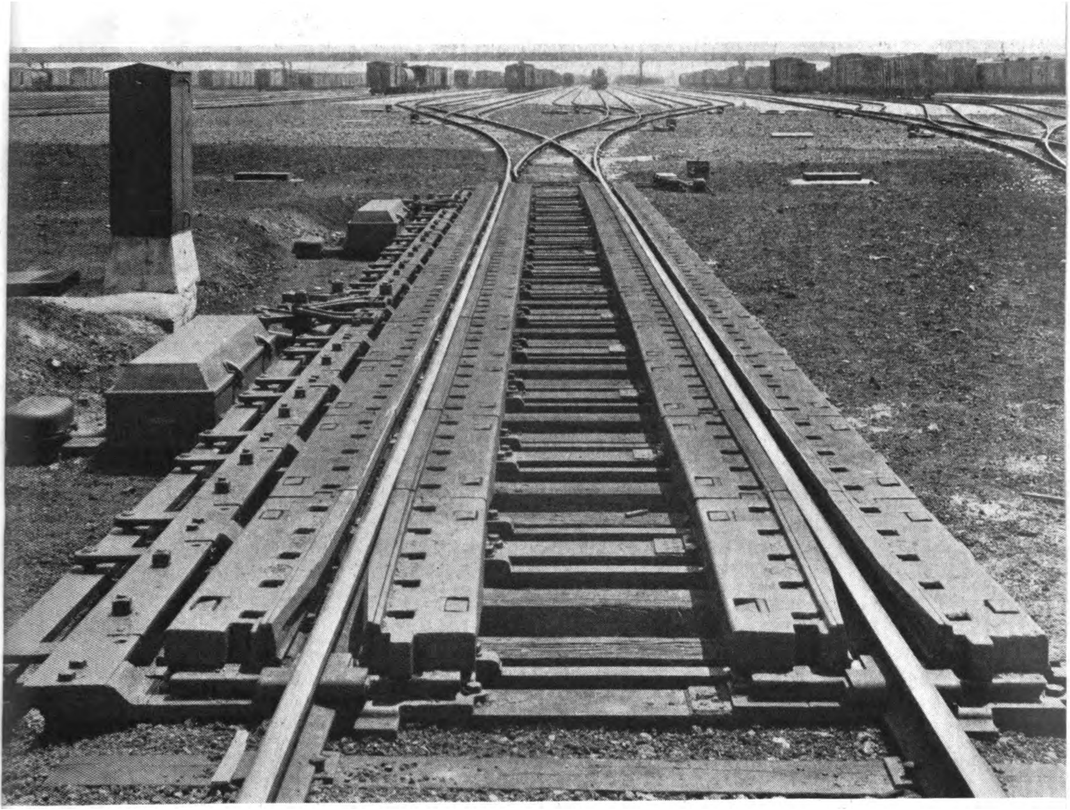
TYPE L ELECTRIC LOCK

A NEWLY developed forced drop Electric Lock for mechanical interlocking levers which locks the lever directly through a co-operative movement taking place between the latch and the lever.

Efficient, long-lived and maintenance-free service is the result.



West Detroit Yard, on the Michigan Central Railroad, one of the many yards where the G-R-S All-Electric System is demonstrating the effectiveness of electric power for the operation and control of retarder yards.



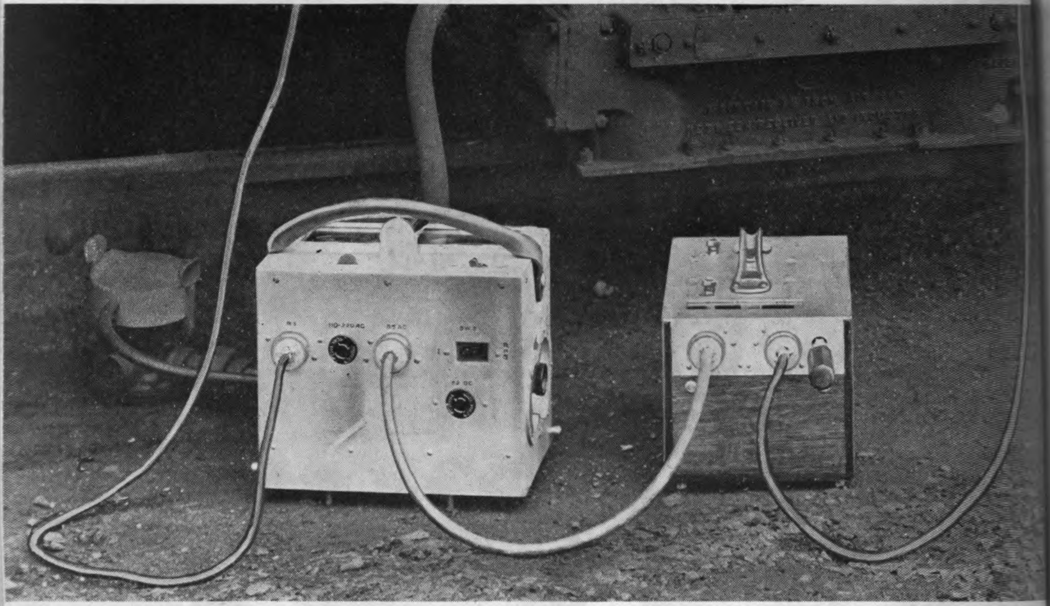
ALL-ELECTRIC TYPE B CAR RETARDER

TYPE B Heavy Duty Retarders are simple, fast, powerful, dependable and economical.

A power toggle arrangement multiplies the forces applied as the degree of retardation is increased.

Effective retardation of all cars is obtained by equalization of shoe pressure for each and every wheel, regardless of variation in wheel thickness and wheel gauge.

This device is not on exhibit, but our engineers will be on hand to give you details on the latest developments in retarders and retarder yards.



LOCOMOTIVE INDUCTIVE TEST SET

THE device shown on the left is a simple and effective outfit for testing the locomotive receiver and R1 relay of the G-R-S Intermittent Inductive Auto-Manual Type equipment used under both Schedules 1 and 2.

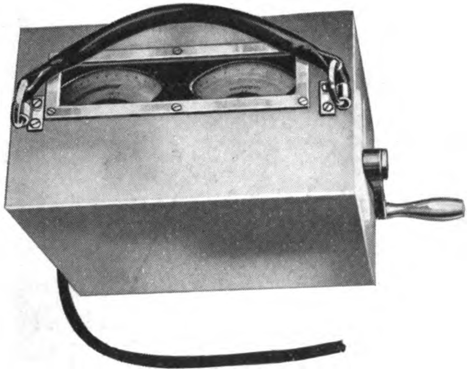
Operates on any commercial A.C. frequency at 110 or 220 volts.

Similar in appearance and principle of operation to the Wayside Inductor Test Set.

TESTING GENERATOR

FOR use with the Locomotive Inductive Test Set when commercial A.C. power is not available.

A small inverted rotary converter housed in an aluminum case, as shown on the right of the above figure, for supplying 60 cycle A.C. from the 32-volt locomotive turbogenerator source.

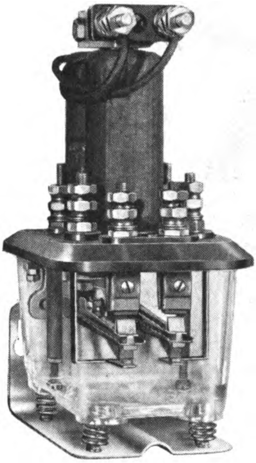


WAYSIDE INDUCTOR TEST SET

A NEWLY developed, small, light-weight, hand-operated, portable outfit for testing wound inductors by the principle of impedance.

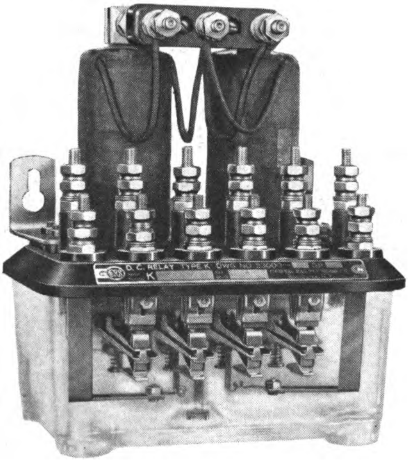
Uniform voltage is impressed across the windings by a hand-operated generator and inductive efficiency shown by current flow.

All equipment is housed in a neat 8 by 11 by 14 inch aluminum case, the whole weighing 40 pounds.



TYPE K TWO-WAY RELAY

A NEW especially designed relay that is ideal where quick shunting of track circuits is desired. It is small and compact and has all the well-known characteristics of the Type K Line.



TYPE K NEUTRAL RELAY

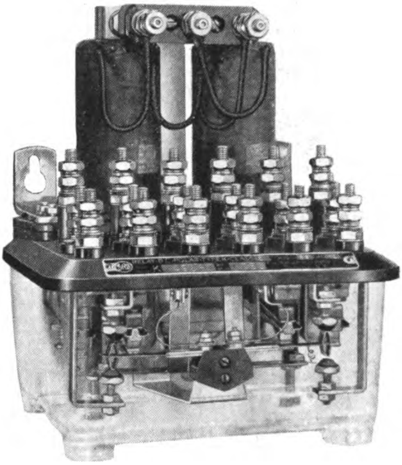
SKILLFUL design plus the use of recently developed superior materials results in the highest performance characteristics yet made available.

4, 6 or 8 way.

TYPE K POLARIZED RELAY

POLAR contact operation equally as positive and dependable as the operation of neutral relay contacts.

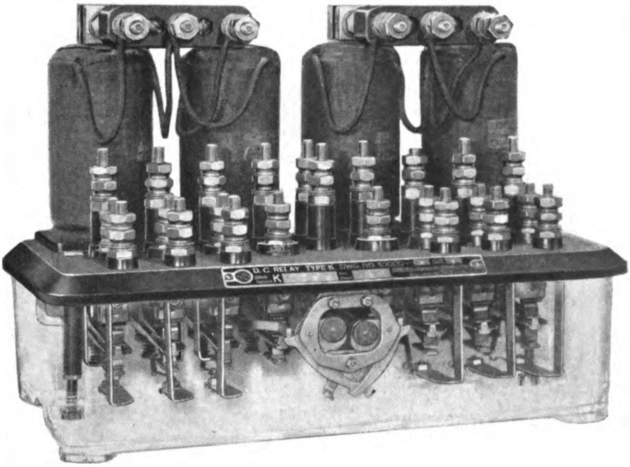
6 or 8 way.

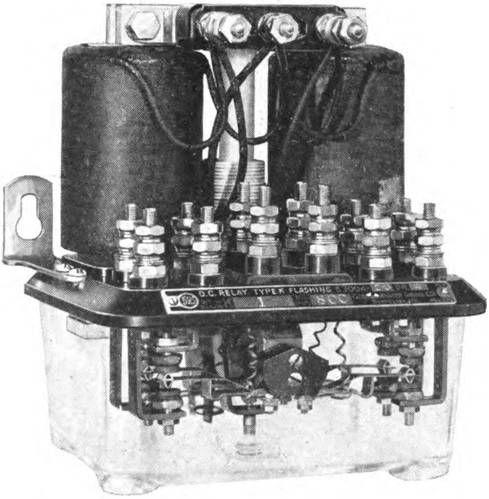


TYPE K INTERLOCKING RELAY

PROVIDED with a newly developed interlocking mechanism which is unusually simple in operation.

Has all the salient features and improved operating values characteristic of the Type K Line.

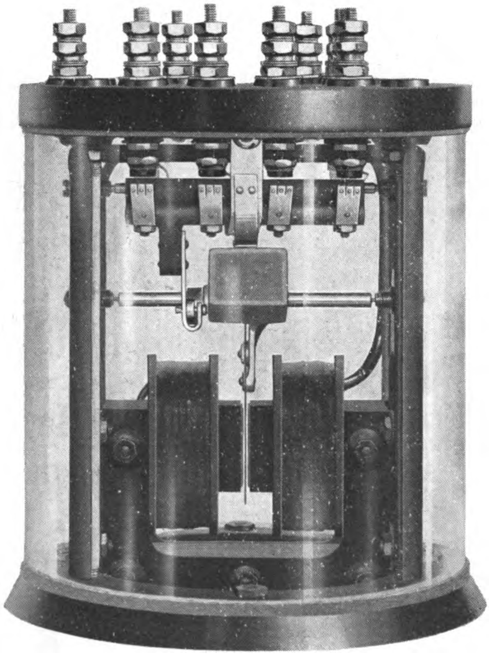




TYPE K FLASHING RELAY

UNIFORM flashing of your highway crossing signals, together with sufficient contact capacity to control individually 8 lamps of 4 flashing signals, are features of the G-R-S Type K Flashing Relay.

We invite you to see this relay in action at the G-R-S Booth—you will be surprised at its simple operation.



TYPE L VANE RELAY

A HIGHLY efficient single or double element vane relay for use on track or line.

Light-weight, rigid construction, unobstructed view and accessibility are constructional features.

Examine this vane relay as well as the complete line of other A.C. relays.

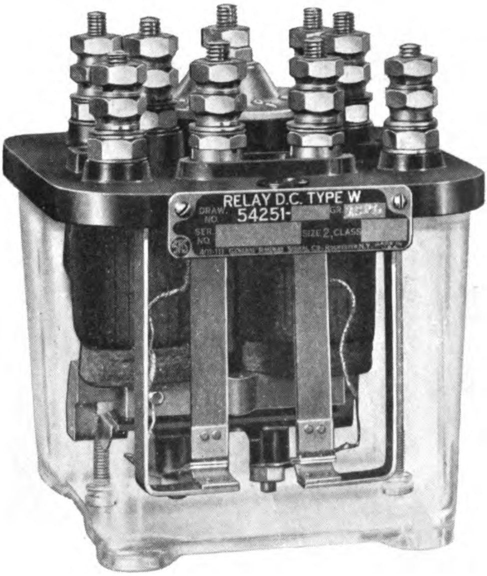
TYPE W RELAYS

NEW, small, low current, one or two point, A.C. or D.C. relays, designed for a wide application.

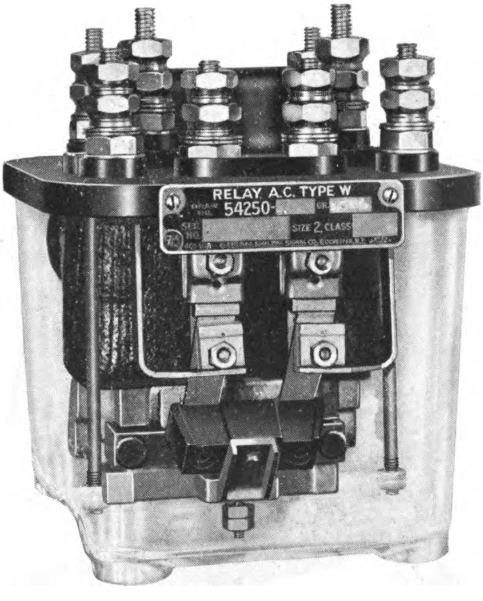
For approach lighting—in series with track or line.

A series "light-out" relay to cut in a reserve indication that may be equal or more restricting.

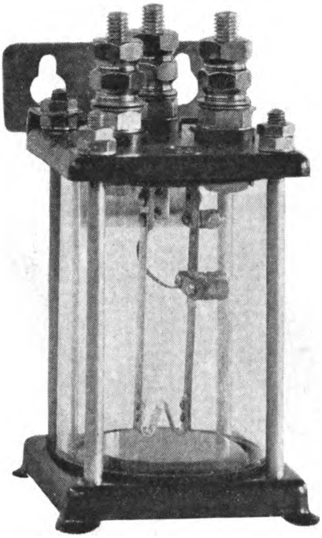
As a "power-off" relay to supply D.C. to normally A.C. lighted signals; or in series with the battery charging circuit to cut in D.C. at a reduction in the A.C. voltage.


RELAY D.C. TYPE W
DRAW. NO. 54251-
SIZE 2, CLASS

D.C.


RELAY A.C. TYPE W
54250-
SIZE 2, CLASS

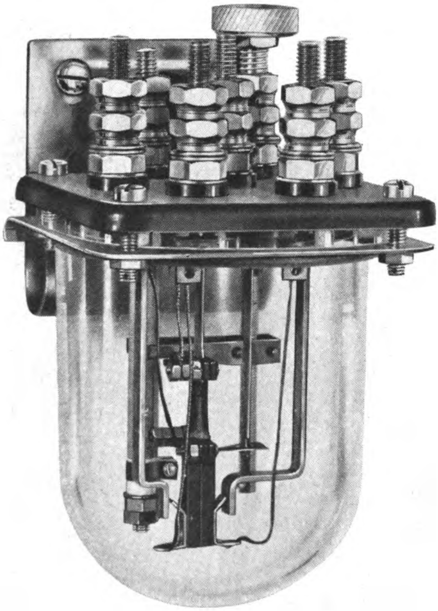
A.C.



TYPE T NON-ADJUSTABLE THERMAL RELAY

FOR the introduction of a short time interval into the pick-up circuit of a relay.

Non-adjustable but can be supplied for any usual delay time.



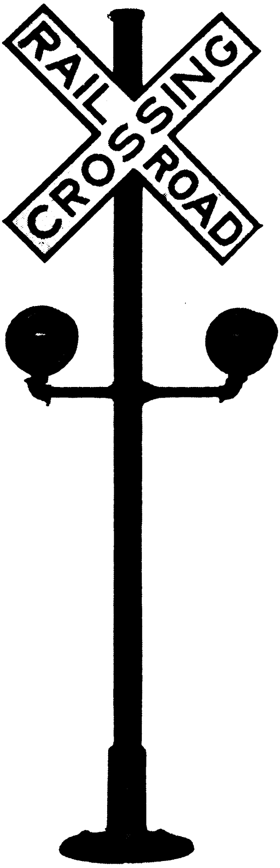
TYPE TB ADJUSTABLE THERMAL RELAY

A NEW, simple, easily adjusted Thermal Relay. Positive and dependable in operation and adjustable from 5 seconds to 3 minutes.

TYPE W HIGHWAY CROSSING SIGNAL

WHEN you visit our booth at the "March Show" be sure to inspect this simple, inexpensive Flashing Light Signal.

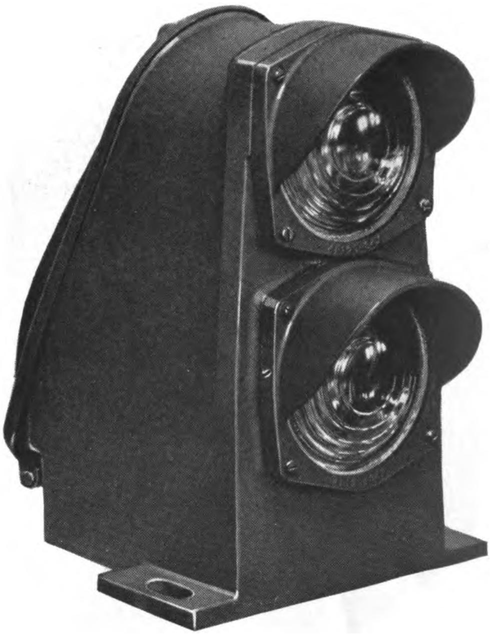
It employs the automobile headlight type of lamp and reflector. It is efficient and compact and provides a very practical means of reducing the hazards at your highway crossings.

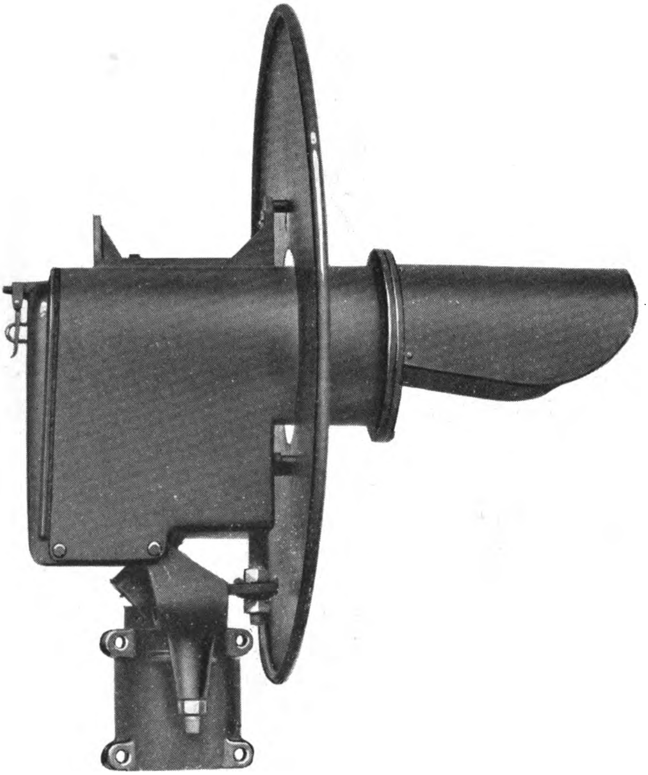


TYPE MD DWARF SIGNAL

A NEWLY designed, compact, two-unit dwarf signal that provides more clearance and which can be supplied with or without space for a relay in its base.

When furnished with space for a relay, as illustrated, fewer relay housings are required which results in an attractive right-of-way.

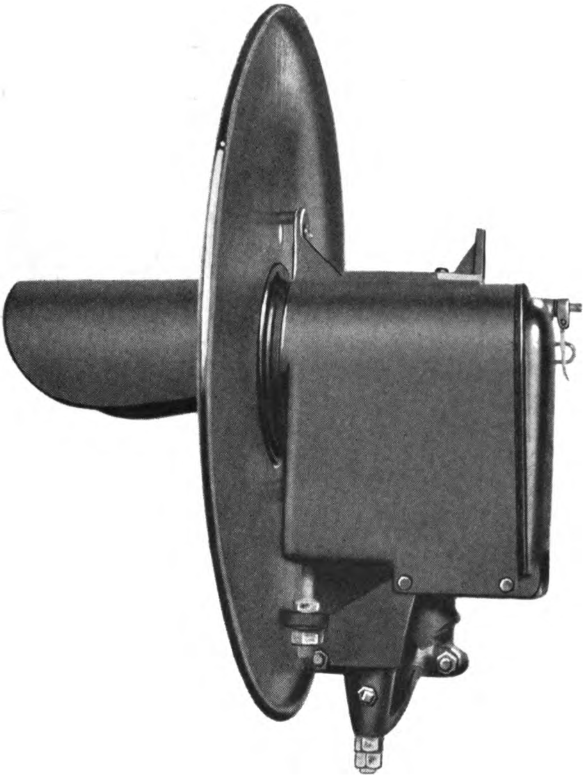




TYPE SA THREE WATT SIGNAL

A NEW, highly efficient, SA Type Signal having a permanent magnet field, a line winding designed for four volts, and a three watt bulb behind special lenses.

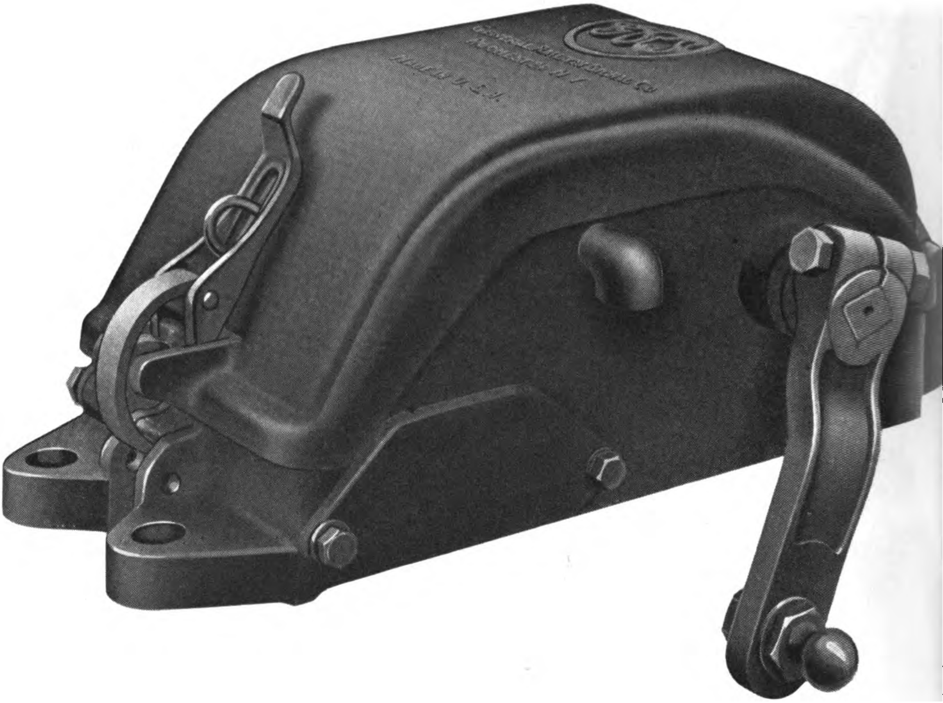
Especially designed and ideal for operation from primary battery sources.



TYPE SA STANDARD SIGNAL

THREE indications projected through the same lens. All superior indications at a low energy consumption.

This SA Signal provides railroads with a simple, modern and efficient method of color-light signaling.



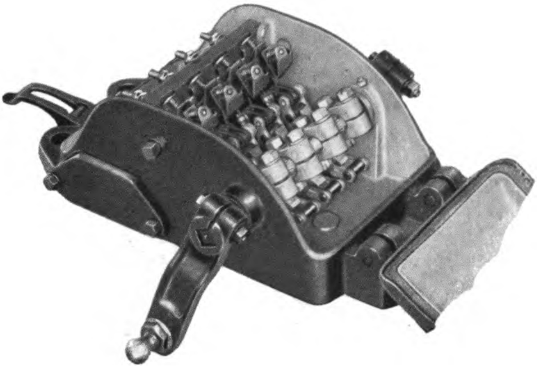
MODEL 7 SWITCH CIRCUIT CONTROLLERS

Two-Position Mechanism

A SIMPLE, positive, rugged switch circuit controller—easy to adjust and easy to maintain.

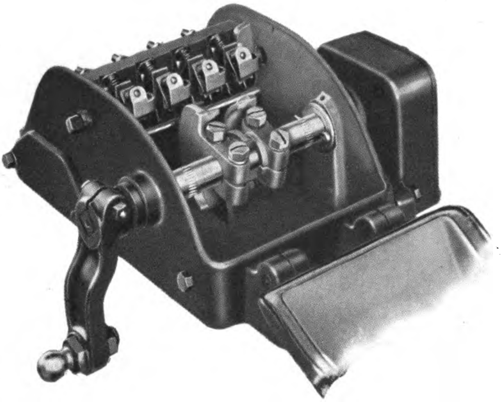
Two-Position Push-Pull Mechanism

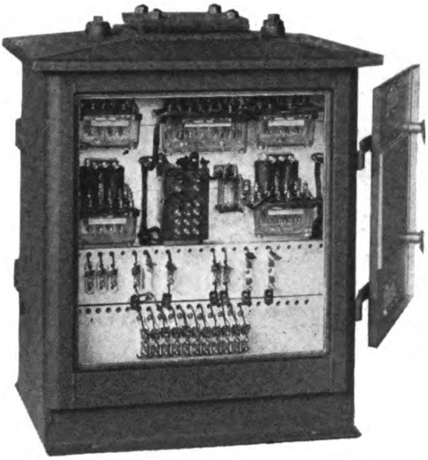
IDEAL where railroad standards require that switch circuit controller contacts be forced in both directions by cam action.

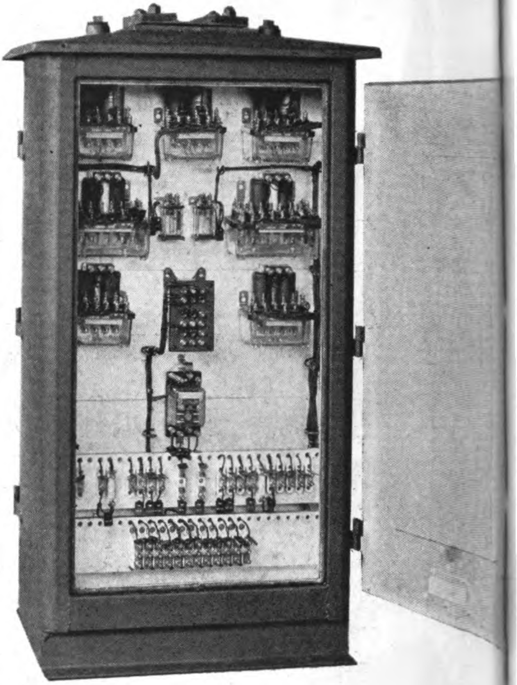


Three-Position Push-Pull Mechanism

ALL the flexibility that a three-position controller provides for circuit connections but giving long-lived, maintenance-free operation comparable with our Model 7, Two-position, Switch Circuit Controller.







WELDED STEEL HOUSINGS

MANUFACTURED by modern production methods and when furnished factory-wired you receive the benefit of this labor-saving and time-saving practice.

Small Housings

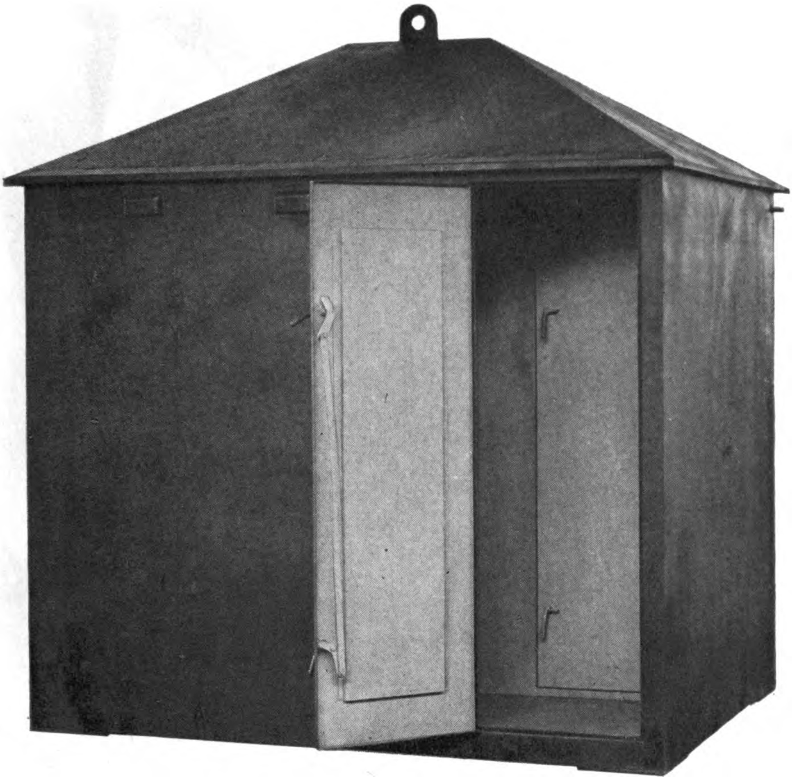
FOR single signal locations and cut sections.

Houses all equipment including batteries.

Medium Sized Housings

FOR double signal locations.

There is ample space for relays on one side and rectifiers and two sets of batteries on the other.



Steel Cabins

HOUSES all equipment of a controlled group in G-R-S Centralized Traffic and Remote Control Systems and provides a built-in telephone-booth at the cabin entrance.

Ideal at interlocking plants where it can take the place of a group of relay, instrument and battery cases. (Not on display.)

Principal Office and Works

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

* * *

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230 PARK AVENUE, NEW YORK CITY

RAILWAY EXCHANGE BUILDING
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512 DRUMMOND BUILDING
MONTREAL, QUEBEC, CANADA

* * *

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METROPOLITAN VICKERS-GRS, LTD.
512, AUSTRALIA HOUSE, STRAND, LONDON, WC 2

COMPAGNIE FRANCAISE THOMSON HOUSTON
Signaux and Enclenchements
14 RUE VASCO DE GAMA, PARIS XV^{e}, FRANCE

GENERAL RAILWAY SIGNAL COMPANY
Pty. Ltd.
440 LITTLE COLLINS ST., MELBOURNE, AUSTRALIA

THE DU BOIS PRESS. ROCHESTER. N. Y.

MODERN CROSSING PROTECTION BY G-R-S

TYPE XA AND XB SIGNALS

Bol

General Railway Signal Co

GIFT
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CALIFORNIA

UNIV. OF CALIFORNIA

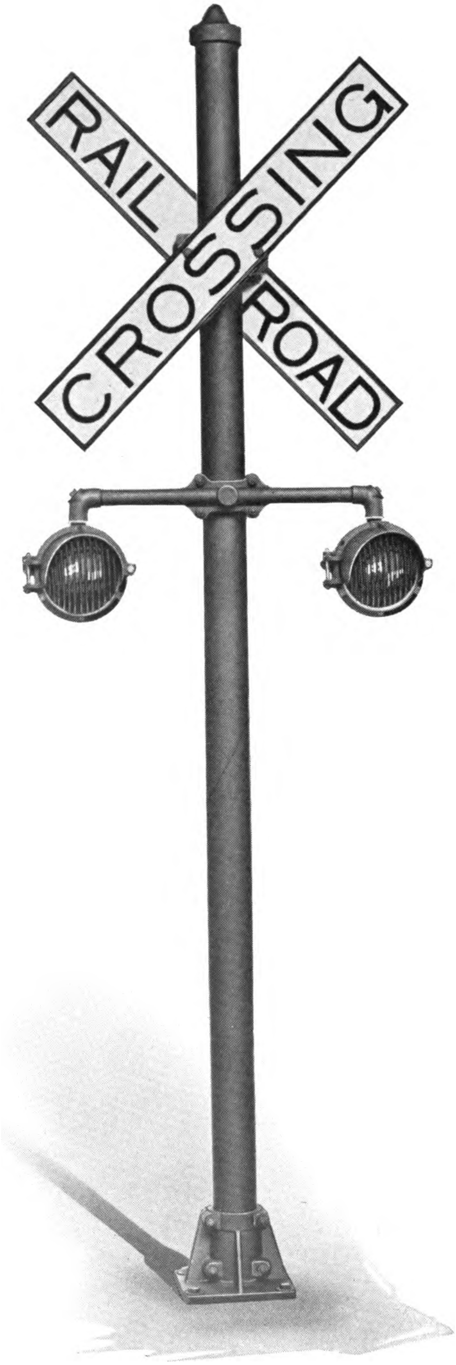
RAIL
ROAD
CROSSING

Figure 1. Highway Crossing Signal using either Type XA or Type XB Light-Units without backgrounds.

MODERN CROSSING PROTECTION

By G · R · S

BULLETIN 165
JUNE, 1931

GENERAL RAILWAY SIGNAL COMPANY
ROCHESTER, N. Y.

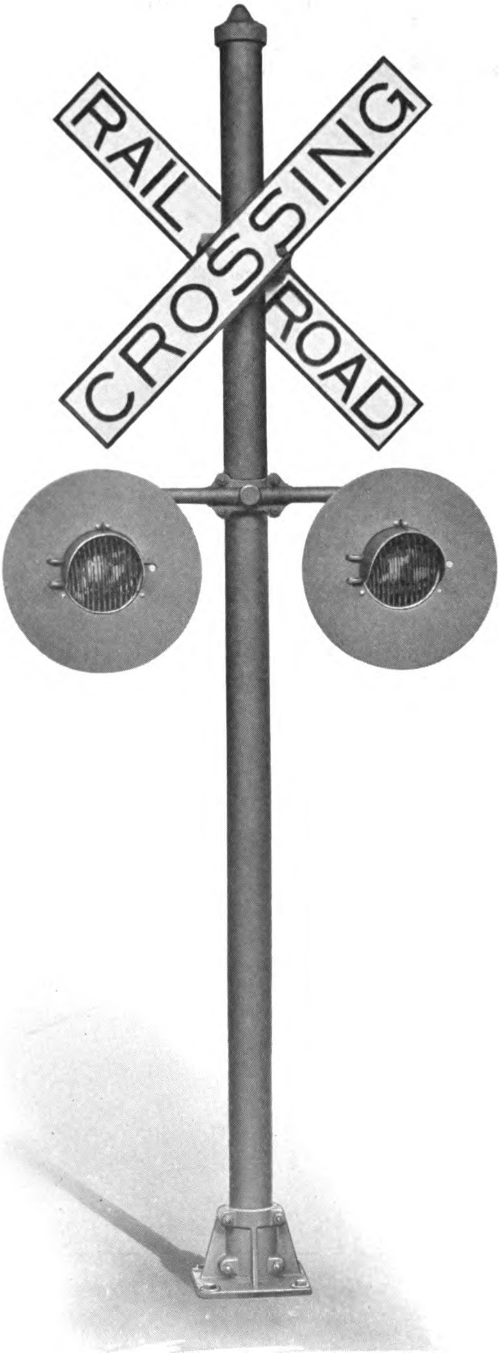

Figure 2. Highway Crossing Signal using either Type XA or Type XB Light-Units with backgrounds.

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Railway Signal Company
Rochester, New York

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MODERN CROSSING PROTECTION BY G·R·S

DURING recent years the improvement of highways has been going on at a prodigious rate, and the number of automobiles, trucks, and busses using these highways has also been increasing rapidly. This state of affairs has increased the demand on railroads for adequate protection of life and property at highway crossings.

Flashing-light Type Signals are more and more becoming the accepted standard as the best method for securing crossing protection twenty-four hours of the day. They give an indication that is distinctive in character from that employed in street traffic signaling. They meet the requirements of Public Service Commissions in most of the States of the United States and have the approval of the Signal Section of the American Railway Association.

G.R.S. Type XA and XB Highway Crossing Signals provide a very effective and dependable means of securing this protection at low cost.

The Type XA Light-Unit is of conventional design and gives an indication from the front of the signal only. This unit is especially suited to furnish protection at single track crossings where there is no possibility of a train on one track obscuring a train approaching the crossing on another track, although it may be used on multitrack crossings.

The Type XB Light-Unit, besides giving an indication from the front, is equipped with a backlight for giving an indication from the rear of the signal or across the tracks. This unit is especially suited to furnish protection at multitrack crossings when the near signal has been passed or the indication obscured and a train on one track obscures a train approaching the crossing on another track, although it may be used on single track crossings.

These units are unusually simple in design and operation. They are compact, light in weight, and easily accessible. Furthermore, they may be installed in a number of different ways to meet the requirements of different locations.

Type XA and XB Signals may be located either at the side or in the center of the highway, depending upon local conditions, standard practice, or individual view-point. When located in the center of the highway, the signal is usually mounted on a substantial concrete base which projects about two feet above the road surface. This base also serves as a buffer for the protection of the signal. Suitable markers are employed in this case to indicate the location of the signal at night. The reflector marker shown in Figure 9 being recommended for this purpose. Figure 10 shows the marker mounting.

Side lights, for observing the operation of the signal from the track, are furnished on both types of units as standard unless otherwise specified, in which case they are blanked out.

Some Signal Engineers and others believe that crossing signals should give indications conforming with street intersection signal indications.

That is, when there is no train approaching the crossing the indication should be green for "Go," and when a train is approaching the crossing the indication should be red for "Stop." For this application, a black background bearing the word "DANGER" is provided for two Type XA Light-Units which are suspended one foot, three inches apart horizontally. The indications given are non-flashing.

TYPE XA LIGHT-UNIT

Construction and Adjustment

THE Type XA Light-Unit consists of a cast case, a cast door with a hood as an integral part, a reflector, a lamp mounting, a colored roundel, and if desired a background. Figure 3 shows a front view of this unit with the door open. It is to be noted that the

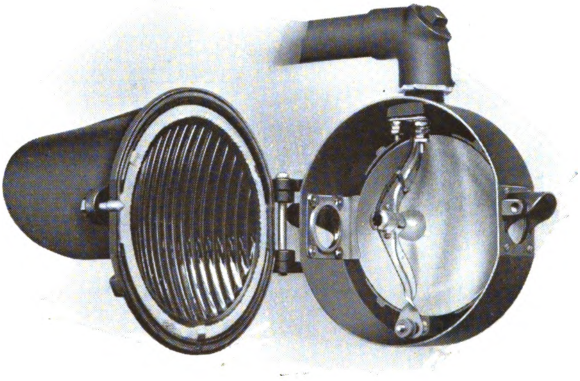


Figure 3. Front view of the Type XA Light-Unit. Door Open.

door opens to the front and gives easy access to all parts of the signal for inspection, cleaning the reflector, renewing the lamp, and tightening terminal nuts.

Mechanical adjustment of the unit in the horizontal and vertical planes, for aligning the beam, is accomplished through movement of the unit in the elbow and movement of the elbow on the cross-arm. Set-screws are provided for securing the unit and elbow in the adjusted position.

TYPE XA OPTICAL SYSTEM

THE optical system of the Type XA Unit, comprising a lamp, reflector, and roundel, is illustrated in Figure 4. The lamp is mounted base forward with the filament located at the focal point of the high grade reflector. This reflector, mounted in the back of the unit, collects the light emitted by the lamp filament and projects the beam of light through either an 8⅜″ Red 30° Spredlite Roundel or an 8⅜″ Red 45° Deflecting Roundel depending upon local crossing conditions.

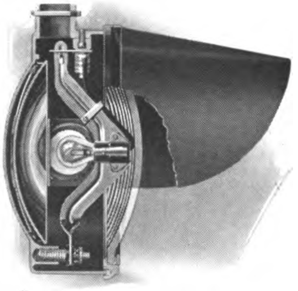


Figure 4. Optical Construction of the Type XA Light-Unit.

The light beam from the 30° Spredlite Roundel has a spread of 15° to each side or a total spread of 30°; while the light beam from the 45° Deflecting Roundel has a spread of 45° to one side only.

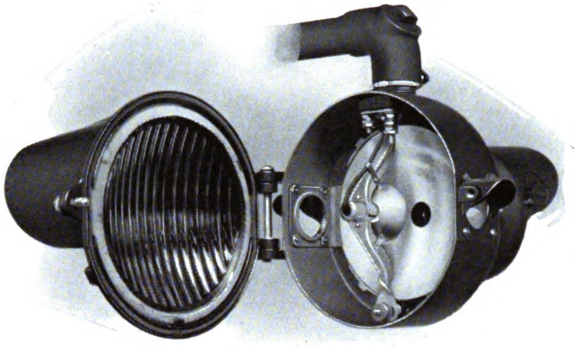


Figure 5. Front view of the Type XB Light-Unit. Door Open.

TYPE XB LIGHT-UNIT

Construction and Adjustment

THE Type XB Light-Unit consists of the same parts as the Type XA Light-Unit with an additional backlight casting, a backlight lens, and a backlight reflector. Figure 5 shows a front view of this unit. As in the Type XA Unit, the door opens to the front for easy access to all parts.

Mechanical adjustment of the main unit, for aligning the light beam, is accomplished in the same manner as in the Type XA Unit. Mechanical adjustment of the backlight is secured by means of a ball and socket joint and four bolts. To align the backlight beam the four nuts on the clamping bolts are loosened, the backlight casting moved about to secure the proper direction of the rear beam, and then clamped securely by tightening the nuts. Figure 6 shows a rear view of this unit and Figure 7 a side view.

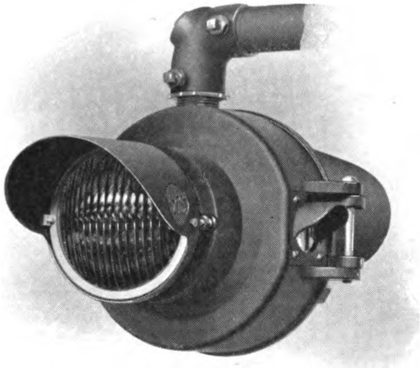


Figure 6. Rear View of the Type XB Light-Unit.

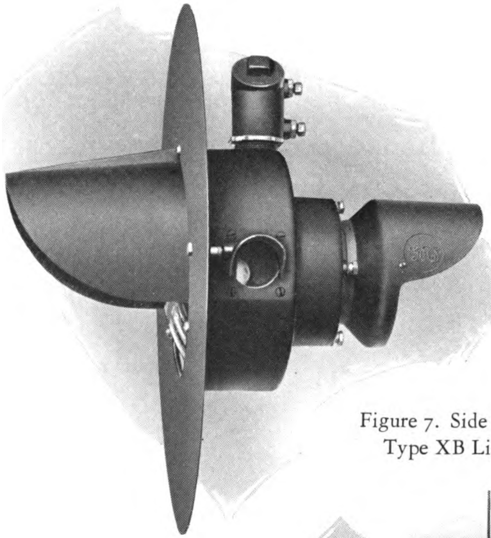


Figure 7. Side View of the Type XB Light-Unit.

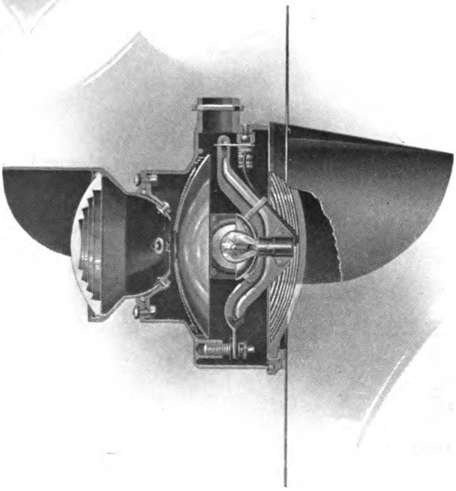


Figure 8. Optical Construction of the Type XB Light-Unit.

TYPE XB OPTICAL SYSTEM

THE optical system of the Type XB Unit, comprising a lamp, two reflectors, a roundel, and a lens, is illustrated in Figure 8. The main beam is produced in the same manner as in the Type XA Unit. The backlight beam is produced by means of a reflector, mounted in front of the lamp, which collects a portion of the light emitted by the filament of the lamp and projects this light through a small hole in the main reflector and thence through either a 5⅜″ Red 30° Spredlite Lens or a 5⅜″ Red 45° Deflecting Lens. With this construction the backlight reflector acts as a baffle to prevent outside light from passing directly through the signal from front to rear, or vice versa.

Lamps, Lamp Mounting, Adjustment

TYPE XA and XB Signals employ the type S-11 single contact, bayonet base lamp bulb having a single concentrated filament. These lamps are especially made for signal service, and are furnished in ratings suitable for use with either 6, 8, 10, or 12 volt storage batteries.

We recommend that lamps be burned slightly under rated voltage as this increases the life of the lamp and ordinarily produces a light beam of ample intensity for a good signal indication. All lamps furnished are stamped with the voltage and wattage at which the average life is 1000 hours.

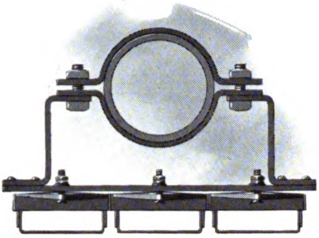


Figure 9. Reflector Marker.

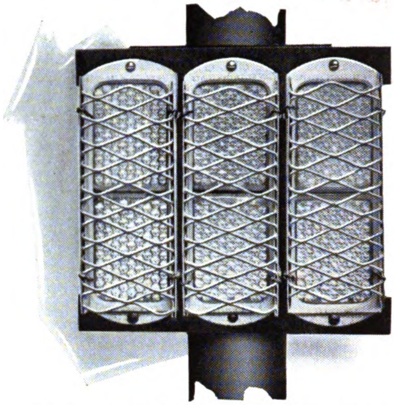


Figure 10. Reflector Marker Mounting.

The lamp socket is supported on a bracket and so arranged that the lamp may be moved vertically, horizontally, and longitudinally in order to place the filament exactly at the focal point of the main reflector.

All light-units are focused properly at the factory, and this adjustment should not be changed in the field unless found absolutely necessary.

REFLECTOR MARKER

THIS unit provides an effective marker for signals located in the center of the highway. No lamp is required since light from the headlights of an approaching automobile is reflected back to the driver so that the entire area of the unit appears as if filled with light. Each marker consists of one, two, or three reflectors, as specified, with the necessary brackets for mounting to the post just above the base. Each reflector is an independent unit, approximately 4″ x 11″ in size, consisting of a thick moulded glass, its support, and a protecting mesh guard. The glass is especially moulded to present a reflecting surface which is effective even when the marker is approached from a considerable angle. Reflectors are furnished clear, yellow, or red as desired. Figures 9 and 10 show this marker and its mounting.

REFLECTOR BUTTON SIGNS

FOR certain locations Reflector Button Signs are especially desirable. One sign bears the warning "Stop on Red Signal" and the other states the number of tracks. The letters or numbers are formed in outline by reflector buttons inserted in metal plates. These signs are illustrated in the Catalog Section, Plate H 2911, Figures E and G.

ILLUMINATED STOP SIGN

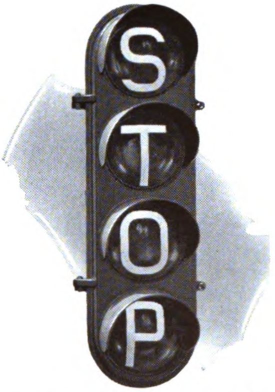


Figure 11. Illuminated Stop Signal.

AN illuminated Stop Sign, Figure 11, is also available in which the letters "S" "T" "O" "P" are illuminated from within when the crossing signal is flashing. This sign is mounted on the pole below the cross-arm.

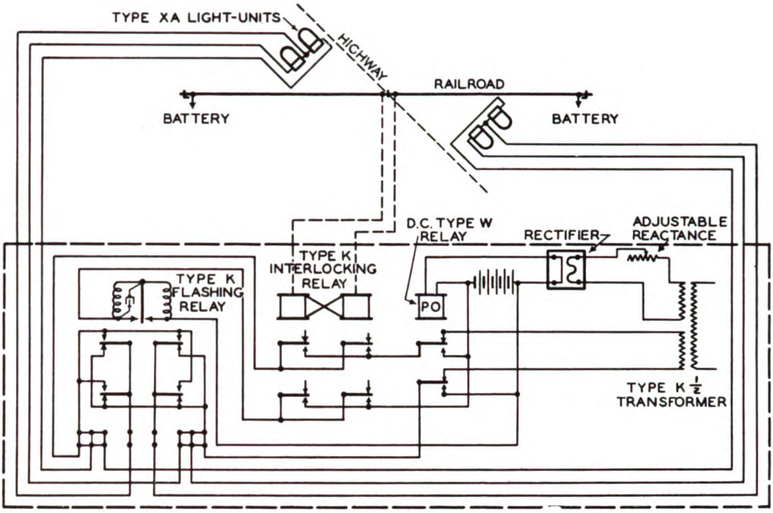

TYPE XA LIGHT-UNITS
HIGHWAY
RAILROAD
BATTERY
BATTERY
D.C. TYPE W RELAY
RECTIFIER
ADJUSTABLE REACTANCE
TYPE K INTERLOCKING RELAY
TYPE K FLASHING RELAY
PO
TYPE K ½ TRANSFORMER

Figure 12. Typical Circuit for the control of Flashing-light Highway Crossing Signals where alternating current is available; with a D.C. power-off relay incorporated therein.

CIRCUITS

TYPICAL circuits for the control of flashing-light highway crossing signals on single and double track crossings are shown in Figures 12, 13, and 14. Each piece of apparatus used in the circuits is described in the following pages.

Where alternating current is available, a very economical and dependable control is obtainable by the use of the circuit shown in Figure 12. A storage battery on trickle charge supplies energy for the flashing relay, while the lamps are normally fed energy from the A.C. supply and upon failure of this supply are fed energy from the battery, the change-over being accomplished by means of a D.C. Type W Relay connected in series with the battery charging

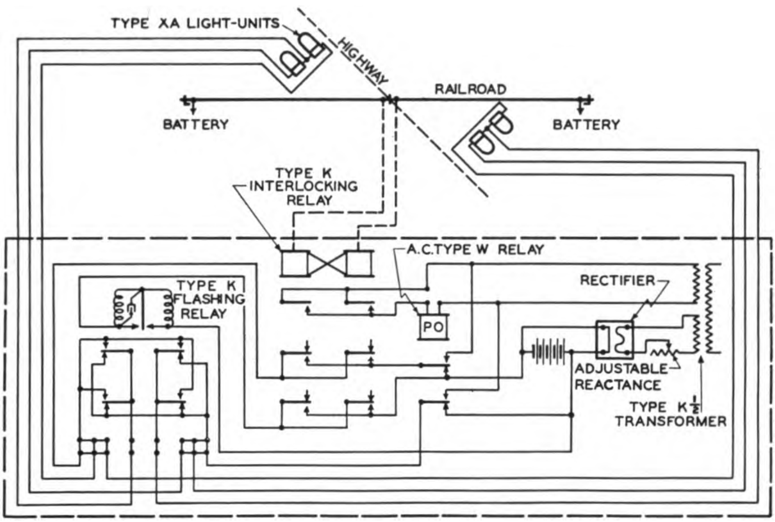

TYPE XA LIGHT-UNITS
HIGHWAY
RAILROAD
BATTERY
BATTERY
TYPE K INTERLOCKING RELAY
A.C.TYPE W RELAY
RECTIFIER
TYPE K FLASHING RELAY
PO
ADJUSTABLE REACTANCE
TYPE K½ TRANSFORMER

Figure 13. Typical Circuit for the control of Flashing-light Highway Crossing Signals where alternating current is available; with an A.C. power-off relay incorporated therein.

circuit. Type XA Light-Units are shown in this circuit, although Type XB Light-Units may be used instead.

Figure 13 shows another circuit for use where alternating current is available. A storage battery, trickle charged by means of a metallic-disc rectifier, is used to furnish direct-current energy for operating the flashing relay and, in case of an A.C. power failure, direct-current energy for lighting the signal lamps.

A unique feature of this circuit is that a normally de-energized A.C. Type W Relay is the power-off relay, which is approach controlled by the interlocking relay. This arrangement is of advantage in that energy is only consumed by the power-off relay upon the approach of a train, the relay is not maintained in an energized position over any considerable period of time, and its contacts are kept clean by intermittent operation. Type XA Light-Units are shown in this

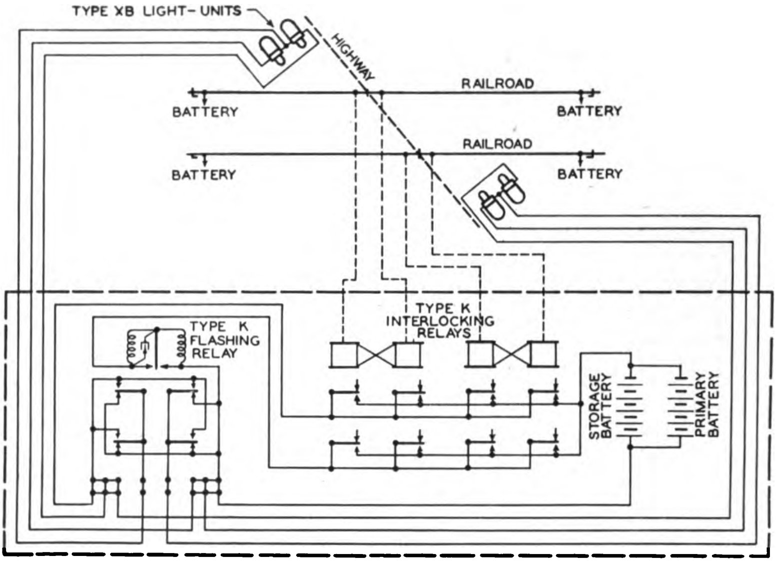

TYPE XB LIGHT-UNITS
HIGHWAY
RAILROAD
BATTERY
BATTERY
RAILROAD
BATTERY
BATTERY
TYPE K
FLASHING
RELAY
TYPE K
INTERLOCKING
RELAYS
STORAGE
BATTERY
PRIMARY
BATTERY

Figure 14. Typical Circuit for the control of Flashing-light Highway Crossing Signals where alternating current is not available.

circuit, although Type XB Light-Units may be used instead.

Where alternating current is not available, the circuit shown in Figure 14 is recommended. Energy is supplied the flashing relay and lamps by a storage battery which is trickle-charged by a primary battery. This circuit shows the crossing protected for both normal and reverse direction running. Type XB Light-Units are shown in this circuit, although Type XA Light-Units may be used instead.

The relay housings shown on Plate E 0933 make very neat and satisfactory housings for the control apparatus. If it is desired to bring wires from a pole line into the top of the 4 inch post supporting the signal, the post should be ordered the proper length equipped with cap, Figure 1, shown on Plate H 2911. Where the signals are located in the center of the high-

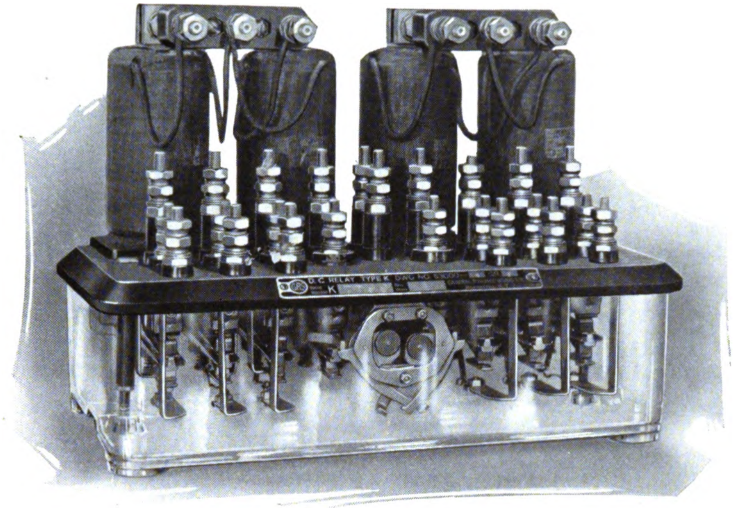


Figure 15. Type K Interlocking Relay.

way, it is usually more desirable to separate the relay case from the signal. See Plate E 0933 for relay cases. Specify the cover plate when desired for the above application.

TYPE K INTERLOCKING RELAY

THE G.R.S. Type K Interlocking Relay, Figure 15, is designed for the control of highway crossing signals where it is desired to furnish protection on both-direction running. It consists of two standard Type K, size four, neutral relays mounted on a common base with a simple, dependable, and safe interlocking mechanism between the two armatures.

The operation of a standard interlocking relay is as follows:—

1st—Normally the coils of both relays are energized and all front contacts are closed.

2nd—The dropping of either relay armature will close its back contacts and place the interlocking parts in position to prevent the back contacts of the other relay from closing when its armature drops.

3rd—With energy restored to the coils of the first relay, its front contacts close and the back contacts open while the armature of the second relay remains locked in its midposition, i.e., with both front and back contacts open.

4th—When energy is restored to the second relay with the first relay energized, the interlocking mechanism is restored to normal and is in position for operation from either relay as before.

The Type K Interlocking Relay has a contact capacity of four dependent front and back contacts on each side. Front contacts, or back contacts, closed with the armature in the locked position may be furnished if desired for special applications.

All contacts are universal.

Special locking combinations can be furnished as required.

STANDARD RESISTANCES IN OHMS

2	16	136	250	450	1000
4	50	150	300	500	2000
11	100	200	400	670	

Simply order Type K Interlocking Relay, specifying the resistance of the relay, and how the contacts are to be locked.

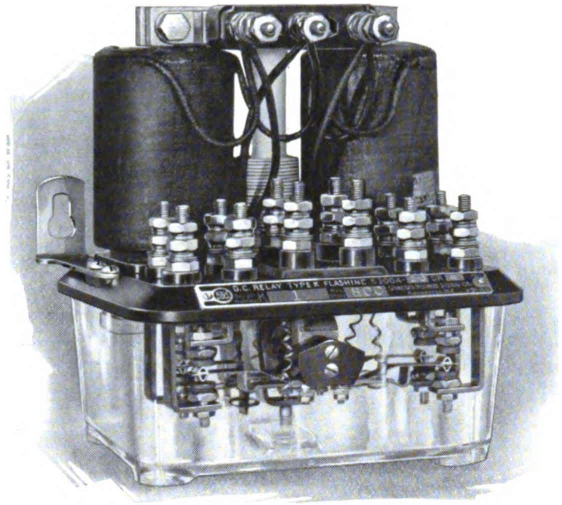


Figure 16. Type K Flashing Relay.

TYPE K FLASHING RELAY

THE G.R.S. Type K Flashing Relay, Figure 16, is a relay for the operation of flashing-light highway crossing signals. It is a compact, neat, and efficient relay that is no larger than the Type K, size four, neutral relay. Four front and back dependent contacts furnish sufficient contact capacity to control and regulate individually 8 lamps of 4 flashing-light crossing signals. With this relay, uniform flashing is not affected by variations in terminal voltage. Due to the construction of this relay all back contacts are made when the coils are deenergized. This feature has been used in the circuits of Figures 12, 13, and 14 to assure a light on each side of the railroad being lighted at full brilliancy continuously in case the relay should fail to operate.

A condenser is provided which eliminates radio interference.

All contacts are universal.

Standard Resistances are as Follows:—

6 volt service	300 ohms per side
8 volt service	600 ohms per side
10 or 12 volt service	800 ohms per side

Simply order Type K Flashing Relay, specifying voltage of battery.

D. C. TYPE W RELAY

THE D.C. Type W Relay as used in series with the battery charging circuit, Figure 12, for cutting the reserve battery on to the lamps when the normal A.C. supply fails is shown in Figure 17. This method of application provides for quiet operation.

This relay is provided with an adjustable air-gap which should be adjusted in the field so that the relay pick-up current is as close as possible to the normal battery-charging rate. When this condition is fulfilled and the circuit of Figure 12 is used, a transfer of energy to the lamps is affected at a much higher percentage of normal A.C. line voltage than when an A.C. power-off relay is used for this purpose.

Simply order D.C. Type W Relay, specifying max. and min. charging current for battery.

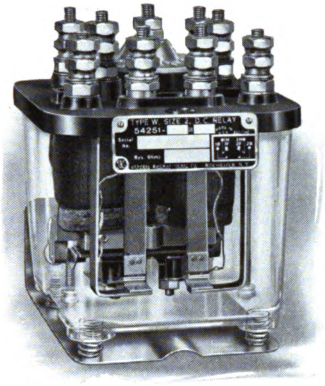


Figure 17. D.C. Type W Relay.

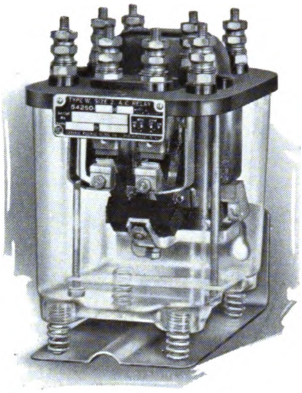


Figure 18. A.C. Type W Relay.

A. C. TYPE W RELAY

THE A.C. Type W Relay as used in a circuit, Figure 13, for selecting the source of energy supply to the lamps is shown in Figure 18.

This is an improved small relay designed to overcome the difficulties experienced with previous relays of this type. It is quiet in operation. It has a wide trunion structure. It has a heavy armature structure, which gives adequate back contact pressure and assures proper release.

It is recommended that the circuit of Figure 13 be used in the application of this relay.

Simply order A.C. Type W Relay, specifying frequency and voltage.

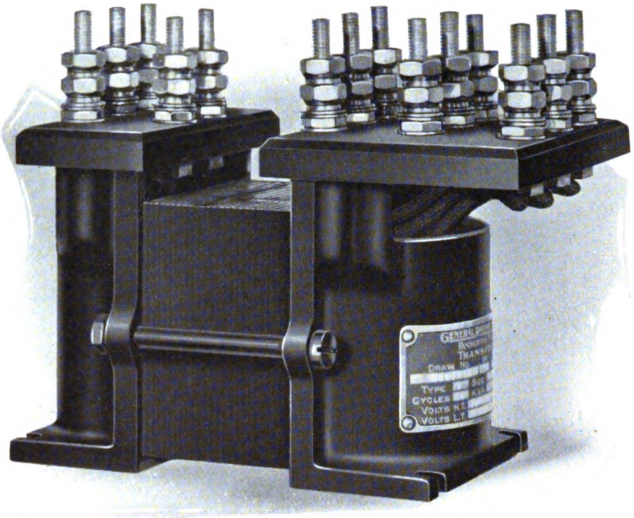


Figure 19. Type K ½ Transformer.

TYPE K ½ TRANSFORMER, RECTIFIER, STORAGE BATTERY

THE Type K ½ Transformer, Figure 19, is employed for supplying energy to the lamps of highway crossing signals and low voltage energy to the rectifier. It is a small air-cooled transformer 4½″ wide by 5⅜″ long, having a 110 volt primary and one or two secondary windings with taps for different voltages.

The G.R.S. Type BX, Size 1, Metallic Disc Rectifier, Figure 20, is recommended for charging the storage battery as shown in the circuits of Figures 12 and 13.

In using the D.C. Type W Relay in series with the battery charging circuit for power-off protection when the charging rate is over 300 mils, one coil of the relay must be shunted out to secure proper

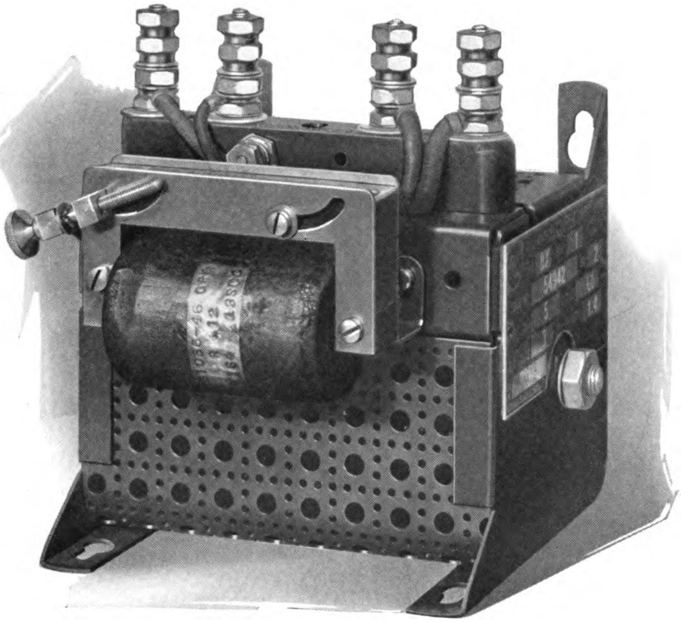


Figure 20. Type BX Metallic-disc Rectifier.

operation of the relay. For this case a Type BX, Size 1, 600 mil rating unit should be used. When the two relay coils are connected in series, the Type BX, Size 1, 350 mil rating unit should be used.

Both of the above units require a transformer for securing the proper voltage input, and both are equipped with a variable air gap reactor for adjusting the charging rate.

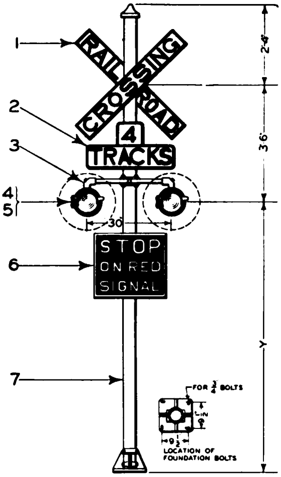
The Type K ½ Transformer, Rectifier, and Storage Battery may be ordered as a group. In this case the following information should be supplied:—

(a) Voltage and frequency of the alternating current supply.

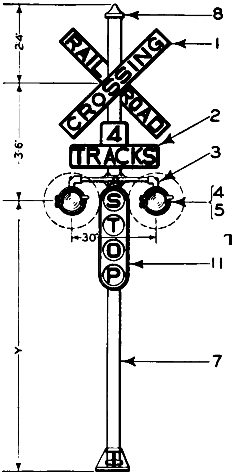
(b) Rating and number of lamps to be used in the installation.

(c) Ampere-hour capacity of the Storage Battery.

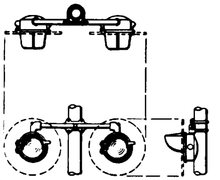
CATALOG SECTION


1
2
3
4
5
6
7
RAIL ROAD CROSSING
4
TRACKS
STOP ON RED SIGNAL
30"
2'-4"
3'-6"
Y
FOR ¾ BOLTS
9½
LOCATION OF FOUNDATION BOLTS

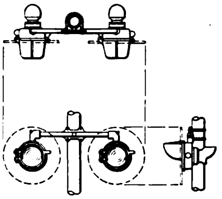
A-Two Unit Signal without Backlights
B-Two Unit Signal with Backlights
C-Four Unit Signal


8
1
2
3
4
5
11
7
RAIL ROAD CROSSING
4
TRACKS
STOP
30"
2'-4"
3'-6"
Y

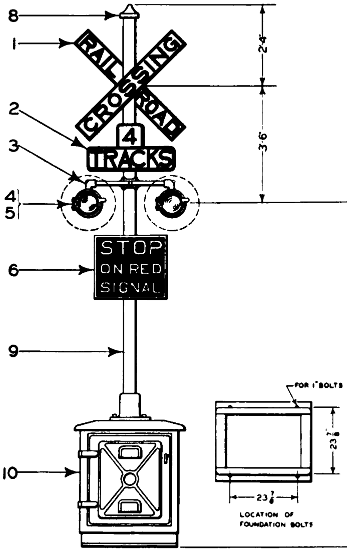
D-Two Unit Signal without Backlights
E-Two Unit Signal with Backlights
F-Four Unit Signal



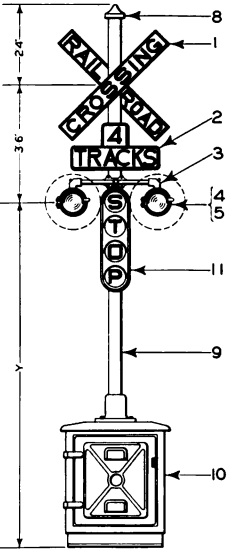
Two Unit Signal without Backlights
A-D-G-K



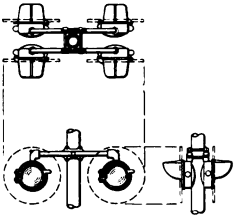
Two Unit Signal with Backlights
B-E-H-L


8
1
2
3
4
5
6
9
10
RAIL ROAD CROSSING
4
TRACKS
STOP ON RED SIGNAL
2'-4"
3'-6"
FOR 1" BOLTS
23⅞
LOCATION OF FOUNDATION BOLTS

G-Two Unit Signal without Backlights
H-Two Unit Signal with Backlights
J-Four Unit Signal


8
1
2
3
4
5
11
9
10
RAIL ROAD CROSSING
4
TRACKS
STOP
2'-4"
3'-6"
Y

K-Two Unit Signal without Backlights
L-Two Unit Signal with Backlights
M-Four Unit Signal



Four Unit Signal mounted in pairs back to back
C-F-J-M

USUAL HEIGHTS		
DIM Y	7'-6"	8'-0"
	8'-6"	9'-0"

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

NOTE: Signals listed below are equipped with sidelights unless otherwise specified. If combinations of equipment are to be mounted on signals other than those illustrated herein, same will be furnished when specified.

All signs of the non-reflecting type are furnished with black letters and border on white background as standard, and all signs equipped with reflector buttons are furnished with white letters and border on black background as standard. Other combinations of colors can be supplied when specified.

See Plate H 2911 for details of caps, pinnacles, reflectors, signs, cross-bucks, ladders and bases.

See Plate H 2913 for signal units. Backgrounds will be furnished only when specified.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units without backlights for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal....................................	45906-130
A1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-130
B	Type XB Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlight roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal..........................	45906-130
B1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..................................	45906-130
B2	same as Fig. B, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..........................	45906-130

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
C	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal....................................	45906-130
C1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-130
C2	same as Fig. C, except has all four units equipped with 45 degree deflecting roundels..	45906-130
D	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units without backlights for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately, giving voltage of storage battery to be used with signal....................................	45906-128
D1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-128
E	Type XB Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal..........................	45906-128

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
E1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses................................	45906-128
E2	same as Fig. E, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..........................	45906-128
F	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal................................	45906-128
F1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels................	45906-128
F2	same as Fig. F, except has all four units equipped with 45 degree deflecting roundels..	45906-128
G	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units without backlights, for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished............	45906-130
G1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels...	45906-130

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
H	Type XB Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished.......	45906-130
H1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses....................................	45906-130
H2	same as Fig. H, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..........................	45906-130
J	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933 Fig. A, will be furnished...........	45906-130
J1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-130
J2	same as Fig. J, except has all four units equipped with 45 degree deflecting roundels...........	45906-130

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
K	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units without backlights, for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished............	45906-128
K1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-128
L	Type XB Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished........	45906-128
L1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses....................................	45906-128
L2	same as Fig. L, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses............................	45906-128

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

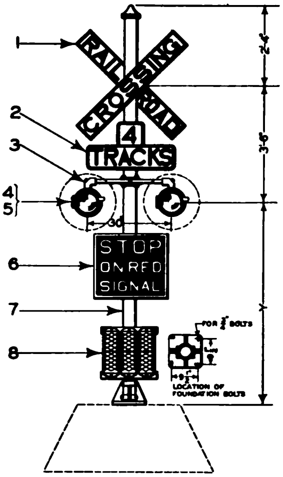
Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
M	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified, relay case as shown on Plate E 0933, Fig. A, will be furnished.	45906-128
M1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels.	45906-128
M2	same as Fig. M, except has all four units equipped with 45 degree deflecting roundels.	
1	Railroad Crossing Sign. For details and order references see Plate H 2911, Figs. H, J and K.	
2	"Tracks" Sign Complete. For details and order references see Plate H 2911, Figs. F and G.	
3	Arm Complete for mounting signal units to pole. For details and order references see Plate H 2911, Fig. B. Includes two U bolts for attaching to 4″ pipe.	48870-9 Gr. 1 5183 Gr. 2 091
4	Type XA Color-light Signal Unit Complete. For details and order references see Plate H 2913	55050-1
5	Type XB Color-light Signal Unit Complete. For details and order references see Plate H 2913	55050
6	"Stop on Red Signal" Sign Complete, as shown. For details and order references see Plate H 2911, Fig. E.	
7	Mast Complete, of 4″ pipe, with base, as shown, for mounting on concrete foundation. Specify length.	

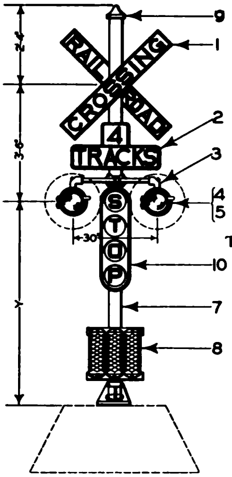
TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

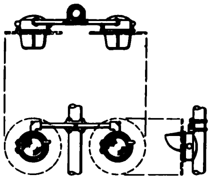
FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
8	Pinnacle, for top of pole. For details and order references see Plate H 2911, Figs. 1, 2 and 3.	
9	Mast Complete, of 4″ pipe, with base as shown. For mounting on top of relay case. Specify length.	
10	Relay Case Complete. For details and order references see Plate E 0933.	
11	Illuminated Stop Sign Complete. For details and order references see Plate H 2911, Fig. A. . .	55200


1
2
3
4
5
6
7
8
2'-4"
3'-6"
30"
Y
RAILROAD CROSSING
4 TRACKS
STOP ON RED SIGNAL
FOR 3/4" BOLTS
9 1/2"
LOCATION OF FOUNDATION BOLTS

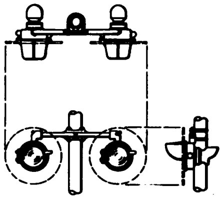
A-Two Unit Signal without Backlights
B-Two Unit Signal with Backlights
C-Four Unit Signal


9
1
2
3
4
5
10
7
8
2'-4"
3'-6"
30"
Y
RAILROAD CROSSING
4 TRACKS
STOP

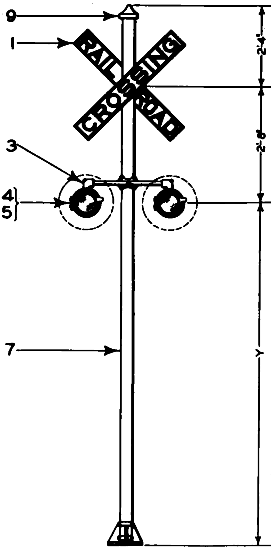
D-Two Unit Signal without Backlights
E-Two Unit Signal with Backlights
F-Four Unit Signal



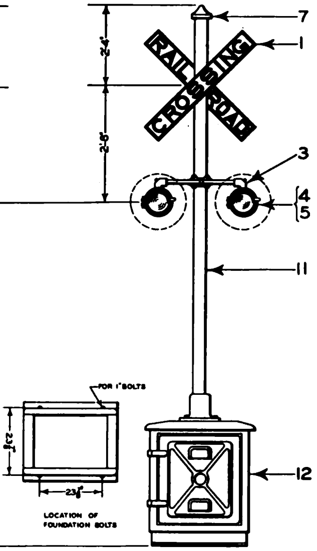
Two Unit Signal without Backlights
A-D-G-K



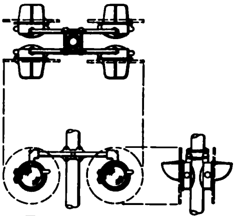
Two Unit Signal with Backlights
B-E-H-L


9
1
3
4
5
7
2'-4"
2'-6"
Y
RAILROAD CROSSING

G-Two Unit Signal without Backlights
H-Two Unit Signal with Backlights
J-Four Unit Signal


7
1
3
4
5
11
12
2'-4"
2'-6"
RAILROAD CROSSING
FOR 1" BOLTS
23 1/8"
23 1/8"
LOCATION OF FOUNDATION BOLTS

K-Two Unit Signal without Backlights
L-Two Unit Signal with Backlights
M-Four Unit Signal



Four Unit Signal mounted in pairs back to back
C-F-J-M

USUAL HEIGHTS		
DIM Y	7'-6"	8'-0"
	8'-6"	9'-0"

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

NOTE: Signals listed below are equipped with sidelights unless otherwise specified. If combinations of equipment are to be mounted on signals other than those illustrated herein, same will be furnished when specified.

All signs of the non-reflecting type are furnished with black letters and border on white background as standard, and all signs equipped with reflector buttons are furnished with white letters and border on black background as standard. Other combinations of colors can be supplied when specified.

See Plate H 2911 for details of caps, pinnacles, reflectors, signs, cross-bucks, ladders and bases.

See Plate H 2913 for signal units. Backgrounds will be furnished only when specified.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units without backlights for signal indication in one direction only. For center of road installations. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.......	45906-130
A1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-130
B	Type XB Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units having backlights, for front and back signal indications. For center of road installations. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.........	45906-130
B1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..................................	45906-130
B2	same as Fig. B, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..........................	45906-130

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
C	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with four units mounted in pairs back to back, for front and back signal indications. For center of road installations. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal	45906-130
C1	as above, except has front units, equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-130
C2	same as Fig. C, except has all four units equipped with 45 degree deflecting roundels...	45906-130
D	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units without backlights for signal indication in one direction only. For center of road installations. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.........	45906-128
D1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-128
E	Type XB Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units having backlights, for front and back signal indications. For center of road installations. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.........	45906-128

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
E1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses....................................	45906-128
E2	same as Fig. E, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses............................	45906-128
F	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with four units mounted in pairs back to back, for front and back signal indications. For center of road installations. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.............	45906-128
F1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-128
F2	same as Fig. F, except has all four units equipped with 45 degree deflecting roundels..	45906-128
G	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units without backlights, for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal	45906-129
G1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels...	45906-129

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
H	Type XB Flashing-light Highway Crossing Signal Complete, as shown, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal..........................	45906-129
H1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses................................	45906-129
H2	same as Fig. H, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses............................	45906-129
J	Type XA Flashing-light Highway Crossing Signal Complete, as shown, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal.................................	45906-129
J1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-129
J2	same as Fig. J, except has all four units equipped with 45 degree deflecting roundels...........	45906-129
K	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units without backlights, for signal indication in one direction only. Signal units are equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify	

TYPES XA AND XB HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
K (*Cont'd*)	dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished.............	45906-129
K1	as above, except has signal units equipped with 8⅜″ dia., red, 45 degree deflecting roundels....	45906-129
L	Type XB Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with two signal units having backlights, for front and back signal indications. Signal units are equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 30 degree spredlite lenses. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished.......	45906-129
L1	as above, except has signal units equipped with 8⅜″ dia., red, front 30 degree spredlite roundels and 5⅜″ dia., red, back 45 degree deflecting lenses..................................	45906-129
L2	same as Fig. L, except has signal units equipped with 8⅜″ dia., red, front 45 degree deflecting roundels and 5⅜″ dia., red, back 45 degree deflecting lenses............................	45906-129
M	Type XA Flashing-light Highway Crossing Signal Complete, as shown, mounted on relay case, equipped with four units mounted in pairs back to back, for front and back signal indications. All four units equipped with 8⅜″ dia., red, 30 degree spredlite roundels. Specify dimension Y. Lamps for signal units must be specified separately giving voltage of storage battery to be used with signal. Unless otherwise specified relay case as shown on Plate E 0933, Fig. A, will be furnished...........	45906-129

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

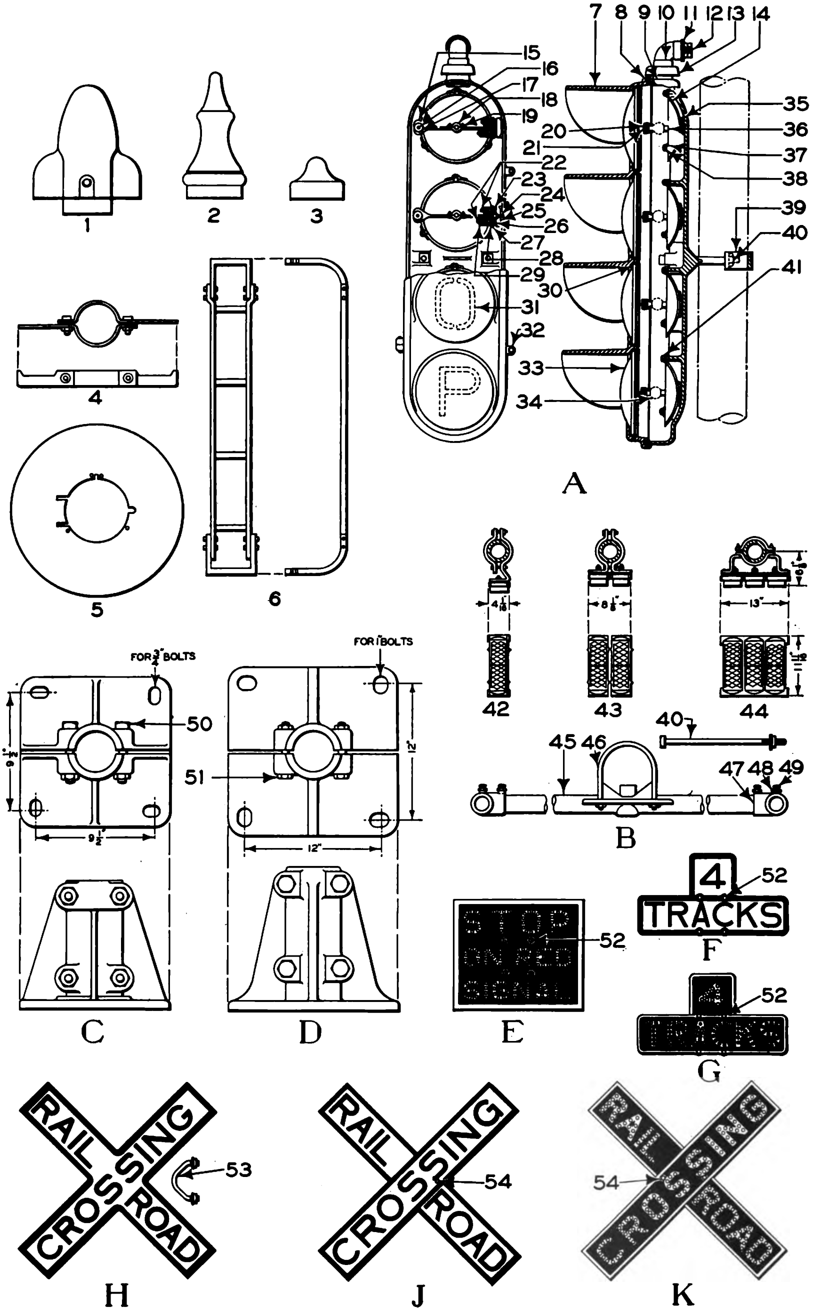
Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
M1	as above, except has front units equipped with 8⅜″ dia., red, 30 degree spredlite roundels and back units equipped with 8⅜″ dia., red, 45 degree deflecting roundels..................	45906-129
M2	same as Fig. M, except has all four units equipped with 45 degree deflecting roundels..	45906-129
1	Railroad Crossing Sign. For details and order references see Plate H 2911, Figs. H, J and K.	
2	"Tracks" Sign Complete. For details and order references see Plate H 2911, Figs. F and G.	
3	Arm Complete, for mounting signal units to pole. For details and order references see Plate H 2911, Fig. B. Includes two U bolts for attaching to 4″ pipe.........................	48870-9 Gr.1 5183 Gr. 2 091
4	Type XA Color-Light Signal Unit Complete. For details and order references see Plate H 2913	55050-1
5	Type XB Color-Light Signal Unit Complete. For details and order references see Plate H 2913	55050
6	"Stop on Red Signal" Sign Complete, as shown. For details and order references see Plate H 2911, Fig. E.	
7	Mast Complete, of 4″ pipe with base, as shown for mounting on concrete foundation. Specify length.	
8	Reflector Unit Complete. For details and order references see Plate H 2911, Figs. 42, 43 and 44.	
8a	Caution Marker, for use in place of reflector, for center of road installation.	
9	Pinnacle, for top of pole. For details and order references see Plate H 2911, Figs. 1, 2 and 3.	
10	Illuminated Stop Sign Complete. For details and order references see Plate H 2911, Fig. A...	55200

TYPES XA AND XB
HIGHWAY CROSSING SIGNALS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
11	Mast Complete, of 4″ pipe with base, as shown for mounting on top of relay case. Specify length.	
12	Relay Case Complete. For details and order references see Plate E 0933.	


1
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7 8 9 10 11 12 13 14
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25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
O
P
A
42
43
44
4 1/16"
8 5/8"
13"
11 1/2"
40
45 46
47 48 49
B
FOR 3/4" BOLTS
FOR 1" BOLTS
50
51
9 1/2"
12"
C
D
STOP ON RED SIGNAL
52
E
4 TRACKS
F
G
RAIL ROAD CROSSING
53
54
H
J
K

TYPES XA AND XB HIGHWAY CROSSING SIGNALS
DETAIL PARTS

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

NOTE: The painting of signs Figs. E, F, G, H, J and K will be furnished as listed below unless other color combinations are specified.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Illuminated Stop Sign Complete, as shown. Includes clamp and bolts for mounting to 4″ pipe. Specify voltage of lamp...............	55200 Gr. 1
B	Arm Complete, as shown, for supporting signal units, includes two U bolts, Fig. 46, for mountint to 4″ pipe.............................	48870-9 Gr.1 5183 Gr. 2 091
B1	as above, except with bolt, Fig. 40, for use when four signal units are mounted in pairs back to back.............................	48870-9 Gr.1 015 072
C	Base Complete, as shown, includes bolts and nuts for attaching to 4″ pipe................	43951-7 Gr.1
D	Base Complete, as shown, includes bolts and nuts for attaching to 4″ pipe................	43951-5 Gr.1
E	"Stop on Red Signal" Sign Complete, as shown, has white letters and border with glass reflector buttons on black background, includes two bolts, nuts and washers for mounting to 4″ pipe...................................	55256-4 20476-18 1048 091
F	"Tracks" Sign Complete, has raised border and letters which are painted black on a white background, includes two U bolts, nuts and washers for mounting to 4″ pipe. Specify numeral desired on sign...........................	55256-5 20476-18 1048 091
G	"Tracks" Sign Complete, equipped with glass reflector buttons, has raised border and letters which are painted white on a black background, includes two U bolts, nuts and washers for mounting to 4″ pipe. Specify numeral desired on sign.............................	55256 20476-18 1048 091

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
H	Railroad Crossing Sign, cast iron, as shown, has raised border and letters on one side of sign, which are painted black on a white background. Includes two U bolts for mounting to 4″ pipe	20896-5 31359 17492
J	Railroad Crossing Sign, cast iron, as shown, has raised border and letters on both sides of sign, which are painted black on a white background. Includes two bolts, nuts and washers for mounting to 4″ pipe	20896-7 0117 091-3
K	Railroad Crossing Sign, cast iron, one side of sign is equipped with glass reflector buttons mounted on raised letters which are painted white on a black background, the other side of sign has raised border and letters which are painted white on a black background. Includes two bolts, nuts and washers for mounting to 4″ pipe	55256-1 Gr.1 55256-2 Gr.1 0117 091-3
K1	as above, except both sides of sign are equipped with glass reflector buttons mounted on raised letters which are painted white on a black background. Includes two bolts, nuts and washers for mounting to 4″ pipe	55256-3 Gr.1 0117 091-3
1	Pinnacle and Cap, for use as wire inlet, for 4″ pipe	30391 36288-2
2	Pinnacle, as shown, for 4″ pipe	1661
3	Cap, as shown, for 4″ pipe	43957-2
4	Step Complete, as shown, for 4″ pipe	20416-3 Gr.1
5	Background, for use with Types XA and XB Highway Crossing Signal Units, shown on Plate H 2913	49162-70

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
6	Ladder Complete, as shown, with clamps for attaching to 4″ pipe. Specify length.	
7	Cover, only, for stop signal	55202
8	Gasket, for use between cover and case	43786-2
9	Case, only, for housing reflectors	55201
10	Elbow, 1¼″, for mounting sign to pole	46082-1
11	Lock Nut, 1¼″, for nipple, Fig. 12	27060
12	Nipple, 1¼″ x 1⅝″ lg., for fastening elbow to pole	48117-1
12a	as above, except 2½″ lg., for fastening elbow to sign	48118
13	Shield, as shown, for nipple, Fig. 12a	54733-1
14	Reflector, as shown, for stop sign	53122-3
15	Arm, for supporting receptacle	55059
16	Eccentric Screw, with insulating washer and bushing for fastening arm, Fig. 15, to case	55134 493-85 6347-18
17	Knurled Nut, No. 14-24 for use with screw, Fig. 16	846-1
18	Receptacle, for lamp	34864-11
19	Screw, No. 4—36 x ⅜″ fil. hd., with nut and lock washer for fastening receptacle, Fig. 18, to arm, Fig. 15	47343-4 12680-10 48526
20	Spring, for receptacle, Fig. 18	586-67

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
21	Screw, No. 4—36 x ¼″ fil. hd., with insulating washer for fastening spring, Fig. 20, to receptacle	12526-1 493-87
22	Screw, No. 14—24 x 1½″ sq. hd., for use as terminal post	350-3
22a	as above, except 1″ lg.	350
23	Nut, No. 14—24 x 3/16″ hex., for use on terminal post, Fig. 22a	42839-5
24	Screw, No. 10—32 x ⅜″, for fastening terminal block, Fig. 25, to case	12563-22
25	Terminal Block, as shown, for stop signal	5971-7
26	Insulating Bushing, for long terminal post, Fig. 22	7350-83
27	Clip, for terminal posts	55065
28	Insulating Washer, for terminal posts	493-62
29	Nut and Washer, No. 14—24 x ⅛″ hex. for terminal posts	46989-2 1225-2
30	Gasket, for use between roundel, Fig. 33 and case	13014-57
31	Plate "O," for use with stop sign, includes screw and washer for mounting	39754-83 2438-12 53029-7
31a	as above, except plate "T"	39754-82 2438-12 53029-7
31b	same as Fig. 31, except plate "S"	39754-81 2438-12 53029-7

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
31c	same as Fig. 31, except plate "P"...........	39754-84 2438-12 53029-7
32	Lock Screw, ⅜″—16, for fastening cover to case	53141-1
33	Roundel, as shown, for stop sign............	53142-6
34	Lamp, for receptacle, specify voltage of storage battery to be used with signal..............	34866
35	Washer, for use between reflector, Fig. 14 and case....................................	4256
36	Spring, for reflector, Fig. 14................	16111-29
37	Lock Washer, for screw, Fig. 38.............	53029-7
38	Screw, No. 10—32 x ¼″ rd. hd., for fastening reflector to case...........................	2438-9
39	Clamp, for fastening stop sign to 4″ pipe.....	318-84
40	Bolt and Nut, ½″—13 x 7″, for fastening clamp Fig. 39, to stop sign, also for use with arm, Fig. B, when four signal units are mounted in pairs back to back.........................	015 072 091
41	Clip, for reflector, Fig. 14..................	18547-25
42	Reflector Unit Complete, with one yellow reflector and clamps for attaching to 4″ pipe. When specified clamps can be furnished for mounting to base........................	53276 Gr. 3
42a	as above, except with red reflector...........	53276 Gr. 2
42b	same as Fig. 42, except with clear reflector.....	53276 Gr. 1

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

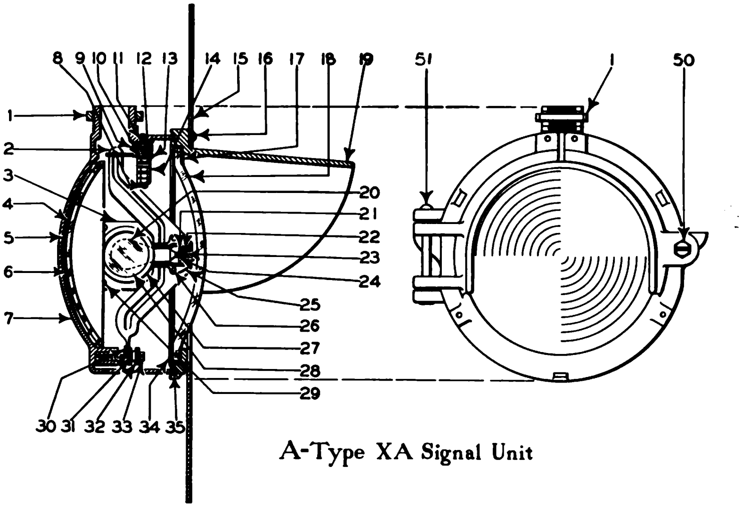
Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
43	Reflector Unit Complete, with two yellow reflectors and clamps for attaching to 4″ pipe. When specified, clamps can be furnished for mounting to base	53276-1 Gr.3
43a	as above, except with red reflectors	53276-1 Gr.2
43b	same as Fig. 43, except with clear reflectors	53276-1 Gr.1
44	Reflector Unit Complete, with three yellow reflectors and clamps for attaching to 4″ pipe. When specified, clamps can be furnished for mounting to base	53276-2 Gr.3
44a	as above, except with red reflectors	53276-2 Gr.2
44b	same as Fig. 44, except with clear reflectors	53276-2 Gr.1
45	Arm, only, for arm complete, Fig. B	55215
46	U Bolt Complete, with nuts and washers, for fastening arm to 4″ pipe	5183 Gr. 2 072 091
47	Elbow, 1¼″, for use on each end of arm, Fig. 45, includes pipe plug, nut Fig. 48, and set screw, Fig. 49	53135-1 18524-5 35519 6894
48	Nut, ⅜″—16 x 3/16″, hex., for use on set screw Fig. 49	35519
49	Set Screw, ⅜″—16 x ¾″ lg., for use on elbow, Fig. 47	6894
50	Bolt and Nut, ⅝″ x 5″ sq. hd., for fastening base, Fig. C, to 4″ pipe	46464
51	Bolt and Nut, ¾″ x 6″ hex. hd., for fastening base, Fig. D, to 4″ pipe	0710

TYPES XA AND XB HIGHWAY CROSSING SIGNALS—DETAIL PARTS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
52	U Bolt ½″—13, with nut and washer, for fastening signs, Figs. E, F and G to 4″ pipe.....	20476-18 1048 091
53	U Bolt, with nut and washer, for fastening sign, Fig. H, to 4″ pipe....................	31359 17492
54	Bolt, ½″ x 9″ lg. with nut and washer, for fastening signs, Figs. J and K, to 4″ pipe.....	0117 091-3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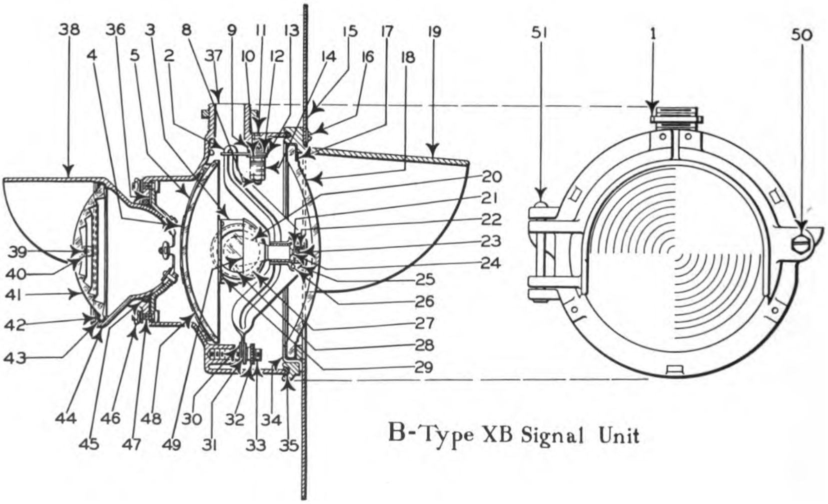
A-Type XA Signal Unit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B-Type XB Signal Unit

TYPES XA AND XB COLOR-LIGHT
SIGNAL UNITS

TYPES XA AND XB COLOR-LIGHT SIGNAL UNITS

NOTE: Signals listed below are equipped with standard roundel and lens combinations. When special combinations are desired same can be furnished when specified.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Type XA Color-light Signal Unit Complete, as shown with background. Equipped with 8⅜″ dia., red, front 30 degree spredlite roundel. Signal Unit is equipped with sidelights unless otherwise specified..........................	55050-1 Gr. 5
A1	as above, except without background........	55050-1 Gr. 1
A2	same as Fig. A, except equipped with 8⅜″ dia., red, front 45 degree deflecting roundel.........	55050-1 Gr. 7
A3	same as Fig. A2, except without background.	55050-1 Gr. 3
B	Type XB Color-light Signal Unit Complete, as shown, with background and backlight. Equipped with 8⅜″ dia., red, front 30 degree spredlite roundel and 5⅜″ dia., red, back 30 degree spredlite lens. Signal Unit is equipped with sidelights unless otherwise specified.....	55050 Gr. 7
B1	as above, except without background........	55050 Gr. 1
B2	same as Fig. B, except equipped with 8⅜″ dia., red, front 30 degree spredlite roundel and 5⅜″ dia., red, back 45 degree deflecting lens......	55050 Gr. 9
B3	same as Fig. B2, except without background..	55050 Gr. 3
B4	same as Fig. B, except equipped with 8⅜″ dia., red, front 45 degree deflecting roundel and 5⅜″ dia., red, back 45 degree deflecting lens......	55050 Gr. 11
B5	same as Fig. B4, except without background..	55050 Gr. 5
1	Lock Nut, for fastening signal unit to cross-arm	27060
2	Arm, for supporting receptacle..............	55059
3	Retainer, for use with reflectors, Figs. 6 and 48, also for retaining glass, Fig. 28..............	55133

TYPES XA AND XB
COLOR-LIGHT SIGNAL UNITS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
4	Washer, felt, for use between reflector and spring, Fig. 5	4256
5	Spring, for holding reflector in place	16111-29
6	Reflector, for use with signal unit, Fig. A	53122-3
7	Case, only, for signal unit, Fig. A	55051-1
8	Screw No. 14—24 x 1½″ sq. hd. used as terminal post for signal unit	350-3
8a	as above, except 1″ lg	350
9	Terminal Block, only, for signal unit	5971-7
10	Insulating Washer, for screw, Fig. 8	493-86
11	Screw, No. 10—32 x ⅜″ fil. hd., for fastening block, Fig. 9, to case	12563-22
12	Clip, for supporting arm, Fig. 2	55065
13	Insulating Washer, for clip, Fig. 12	493-62
14	Nut, No. 14—24 x ⅛″ hex. includes washer, for use on terminal post, Fig. 8	46989-2 1225-2
15	Background, as shown, for signal unit. For details and order references see Plate H 2911, Fig. 5	49162-70
16	Screw ¼″—20 x 5/16″ rd. hd., includes washer, for fastening background, Fig. 15, to hood, Fig. 19	3955-19 0510-1
17	Gasket, as shown, for roundel, Fig. 18	13014-57
18	Roundel, red, as shown, has 30 degree spread.	53142-6
18a	as above, except has 45 degree spread	53142-7
19	Hood, for signal units equipped with background	55052-3

TYPES XA AND XB
COLOR-LIGHT SIGNAL UNITS

Drawing references are shown for convenience in checking shipping lists and invoices.

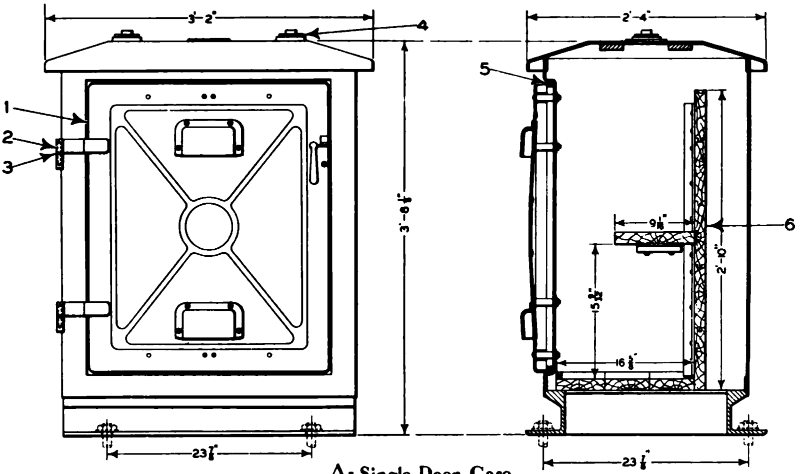
FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
19a	as above, except for signal units not equipped with background	55052
20	Lamp, for signal units, specify voltage of storage battery to be used with signal	34866
21	Insulating Washer, for use between spring, Fig. 22 and washer, Fig. 24	493-87
22	Spring, as shown, for receptacle, Fig. 25	586-67
23	Screw No. 4—36 x ¼″ fil. hd., includes nut, for receptacle, Fig. 25	12526-1 12680-10
24	Washer, for screw Fig. 23	17540-1
25	Receptacle, for lamp, Fig. 20	34864-11
26	Screw No. 4—36 x ⅜″ fil. hd., includes nut and washer, for fastening receptacle, Fig. 25, to arm, Fig. 2	47343-4 48526 12680-10
27	Ring, for holding glass, Fig. 28, in place	43712-4
28	Glass, for signal units equipped with sidelights	924-3
28a	Disc, for signal units not equipped with sidelights	39719-21
29	Screw, No. 10—32 x ⅜″ rd. hd., includes nut, for fastening retainer, Fig. 3, to case	2438-12 577-2
30	Bushing, for screw, Fig. 33	6347-18
31	Insulating Washer for screw, Fig. 33	493-85
32	Knurled Nut No. 14—24 for screw, Fig. 33	846-1
33	Eccentric Screw, for supporting arm, Fig. 2	55134
34	Clip, as shown, for roundel, Fig. 18	18547-44
35	Gasket, for use between case and hood	47562

TYPES XA AND XB COLOR-LIGHT SIGNAL UNITS

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
36	Ring, for use between case, Fig. 37, and hood on backlight	43712-5
37	Case, only, for use with signal unit, Fig. B	55051
38	Hood, as shown, for backlight	55052-1
39	Screw, No. 10—32 x 5/16″ fil. hd., for locking ring, Fig. 42, to lens	12280-3
40	Nut, No. 10—32 x 1/8″ sq. for screw, Fig. 39	31784-1
41	Lens, red, has 30 degree spread	45699-1
41a	as above, except has 45 degree spread	45699-2
42	Ring, for holding lens, Fig. 41, in signal unit	43712-3
43	Gasket, for lens, Fig. 41	13014-74
44	Retainer Complete, includes clip and rivets for fastening to hood	55132 Gr. 1
45	Gasket, for use between case, Fig. 37, and retainer, Fig. 44	47562
46	Nut, No. 14—24 x 5/16″ hex. for screw, Fig. 47	42843-1
47	Screw, No. 14—24 x 7/8″ sq. hd., for fastening retainer, Fig. 44, to case	3034-7
48	Reflector, as shown, for signal unit, Fig. B	53122-4
49	Reflector Complete, as shown, for backlights	55130 Gr. 1
50	Screw, 3/8″—16, for locking hood, Fig. 19, to case, for signal units, Figs. A and B	53141-1
51	Rivet, 3/8″ dia. x 3¾″ lg., used as hinge pin for hood	26733-5

Memoranda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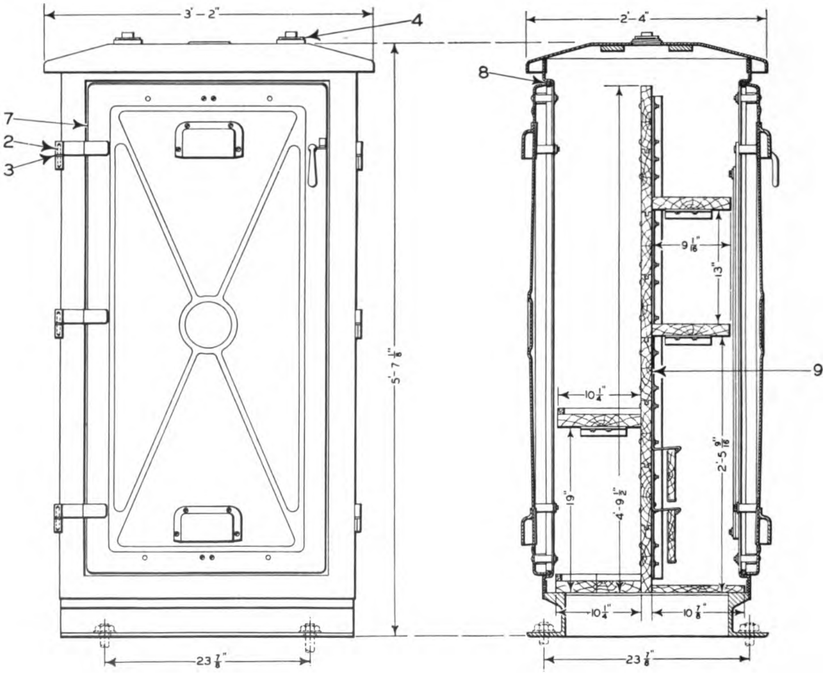
A- Single Door Case
B-Double Door Case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C-Double Door Case

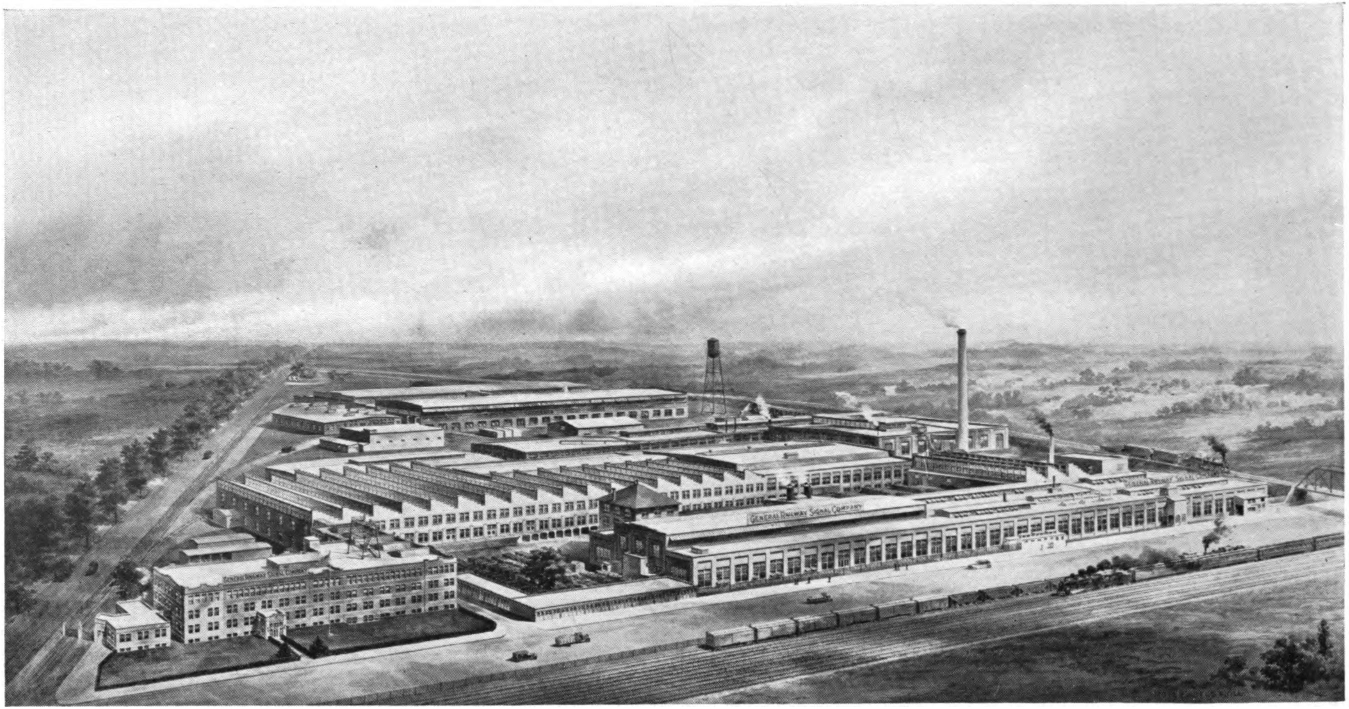
RELAY CASES

RELAY AND INSTRUMENT CASES

NOTE: The shelvings shown are merely typical arrangements and give principle dimensions. Shelvings to meet any requirement will be furnished when specified.

Drawing references are shown for convenience in checking shipping lists and invoices.

FIG. NO.	NAME	DRAWING REFERENCE
	Order by plate, figure number and name	
A	Relay and Instrument Case Complete, single door, as shown, arranged for mounting mast on top. Includes shelving, as shown, unless otherwise specified	36006-16
B	Relay and Instrument Case Complete, with front and back doors, arranged for mounting mast on top. Includes shelving, Fig. 6a	36006-15
C	Relay and Instrument Case Complete, with front and back doors, as shown, arranged for mounting mast on top. Includes shelving and terminal boards, as shown, unless otherwise specified	36006-14
1	Door Complete, as shown, for cases, Figs. A and B	37868-36Gr.1
2	Hinge Pin, for door, for cases Figs. A, B and C.	504-187
3	Washer, for use between hinges on door and case	1225-41
4	Pipe Plug, 2½", as shown	18524-3
5	Gasket, 10'-6" lg., for door, Fig. 1	43460-3
6	Shelving Complete, for single door case, Fig. A	54107-2 Gr. 3
6a	as above, except for double door case, Fig. B, includes terminal boards	54107-1 Gr. 5
7	Door Complete, as shown, for case, Fig. C.	37868-37Gr.1
8	Gasket, 28' lg., for door, Fig. 7	43460-3
9	Shelving Complete, for double door case, Fig. C, includes terminal boards	54107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